FOOD MANUFACTURE

Incorporating Food Industries Weekly

A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP APRIL 1, 1959

Food Tech

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Biscuit	Biscuits (all types).	**'Carameleff'**	Caramel desserts, cakes, fillings, icings, fondants, ice-cream (imparts the old-fashioned true 'burnt sugar' flavour).

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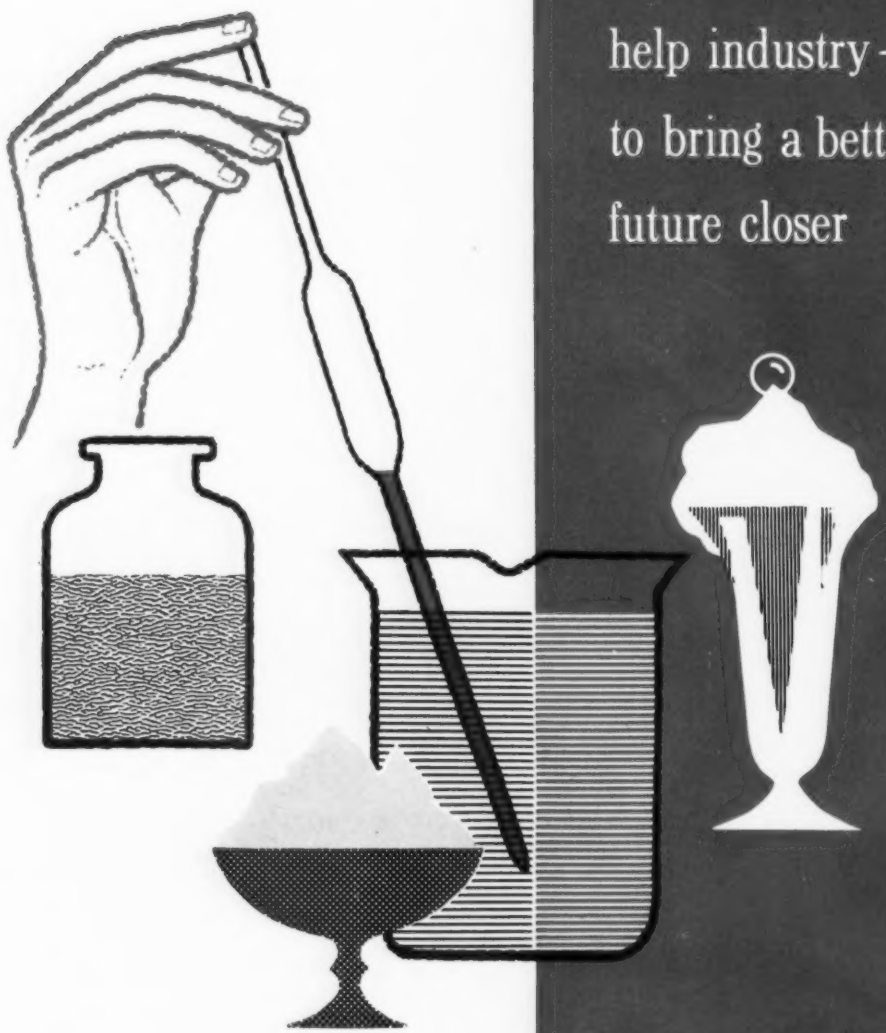

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In order to safeguard themselves manufacturers should insist on obtaining only genuine MSB the unique additive now based on a formula which does not conflict with any known patents in the United Kingdom, Commonwealth or Western Europe.

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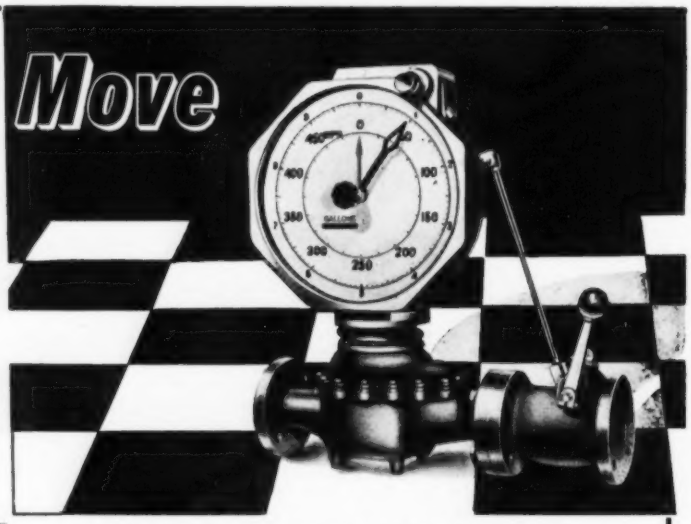

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Resistance Heating-1

In this form of heating, the heat is produced by passing an electric current through a high resistance conductor which is termed the " heating element ".

The heat is transferred from the heating element to the work by convection, radiation or conduction, or by a combination of any, or all of these. When it is a question of radiation or convection, the element can be a bare wire or strip of suitable material, provided it is adequately supported on electrical insulation capable of withstanding the temperature.

When there is to be contact between the work and the element, heat being transferred to the work by conduction, the wire or strip must be surrounded by suitable insulating material and enclosed in a protective sheath.

In the majority of cases, the wire or strip forming the heating element is made of a nickel-chromium alloy which has a high electrical resistance and can be safely used in air at temperatures of up to 1050°C., or in a suitable atmosphere, of up to 1150°C. Other element materials are available for use at higher temperatures.

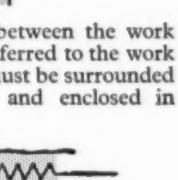
Sheathed elements, essential for contact heating but also used widely for convection and radiation heating because of the convenience afforded by the mechanical strength of the sheath, usually metallic, and by their "built-in" electrical insulation, cannot be used at temperatures as high as the bare wire or strip. This is because the wire, being embedded in insulation, is always at a higher temperature than the sheath, and to keep the wire temperature down to a safe figure the sheath temperature is usually limited to a maximum of around 800°C.

Automatic temperature control of resistance heating elements within narrow limits is easily effected, but if manual control only is desired, devices are available which enable the heat output of the elements to be controlled precisely at a required level. As with all electrical methods, a time switch may be included in the control circuit for automatically switching on or off at predetermined times, and this can enable, for example, an electric oven to be fully up to working temperature by the time the working day starts. Since there are no combustion products from the heaters, there is no need to build flues or special ventilating arrangements which also carry away useful heat.

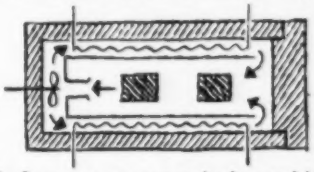
Electric resistance heating may profitably be put to many diverse uses; two of these are described briefly below, others will be listed in a subsequent data sheet.

Furnace Heating

Electric resistance furnaces can be divided into two main categories, batch type and continuous. In most cases, the heating elements are of nickel-chromium alloy, for furnace temperatures up to around 1050°C., but higher temperatures, up to nearly 3000°C., can be obtained by using other metals or alloys, or in some cases non-metallic elements. A protective atmosphere is desirable to prolong the life of some of these higher-temperature elements. For all temperatures, electric resistance furnaces can be constructed so that the heating process takes place in a controlled atmosphere if this is dictated by the composition or heat requirements of the work charge. In some furnaces, fans are used to circulate the air or special atmosphere over the charge, thereby giving increased heating rates and a uniform temperature over the whole charge.



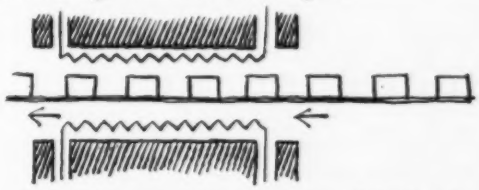
Automatic temperature control and program control of the heating process are readily effected.



Electric furnaces are extensively used in industry, for example in the general heat treatment of metals, in the glass and ceramics industries, for brazing and sintering, and for many other applications requiring temperatures above 500°C.

Oven Heating

There are two basic forms of heat transfer used in electric resistance ovens: convection and radiation. The latter is dealt with in a separate data sheet under the heading " Infra-Red Heating ".



Convection ovens may again be of the batch or continuous type. In either case, the charge is heated mainly by the movement of hot air, which is sometimes assisted, as in furnaces, by fans to give a rapid and uniform temperature rise. Ovens are normally designed for temperatures of up to about 500°C., and the heating elements are invariably of nickel-chromium or nickel-chromium-iron alloy.

Ventilation, when required, can be provided and regulated entirely to suit the heating process. Temperatures and times are readily controlled. A vacuum can be maintained in suitably designed ovens to assist in the extraction of moisture and solvent.

Convection ovens are extensively used for drying, baking and stoving operations, and for a host of other processes requiring a low or medium temperature.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, W.C.2.

Excellent reference books on electricity and productivity (8/6 each, or 9/- post free) are available—"Induction and Dielectric Heating" is an example; "Resistance Heating" is another.

E.D.A. also have available on free loan a series of films on the industrial use of electricity. Ask for a catalogue.

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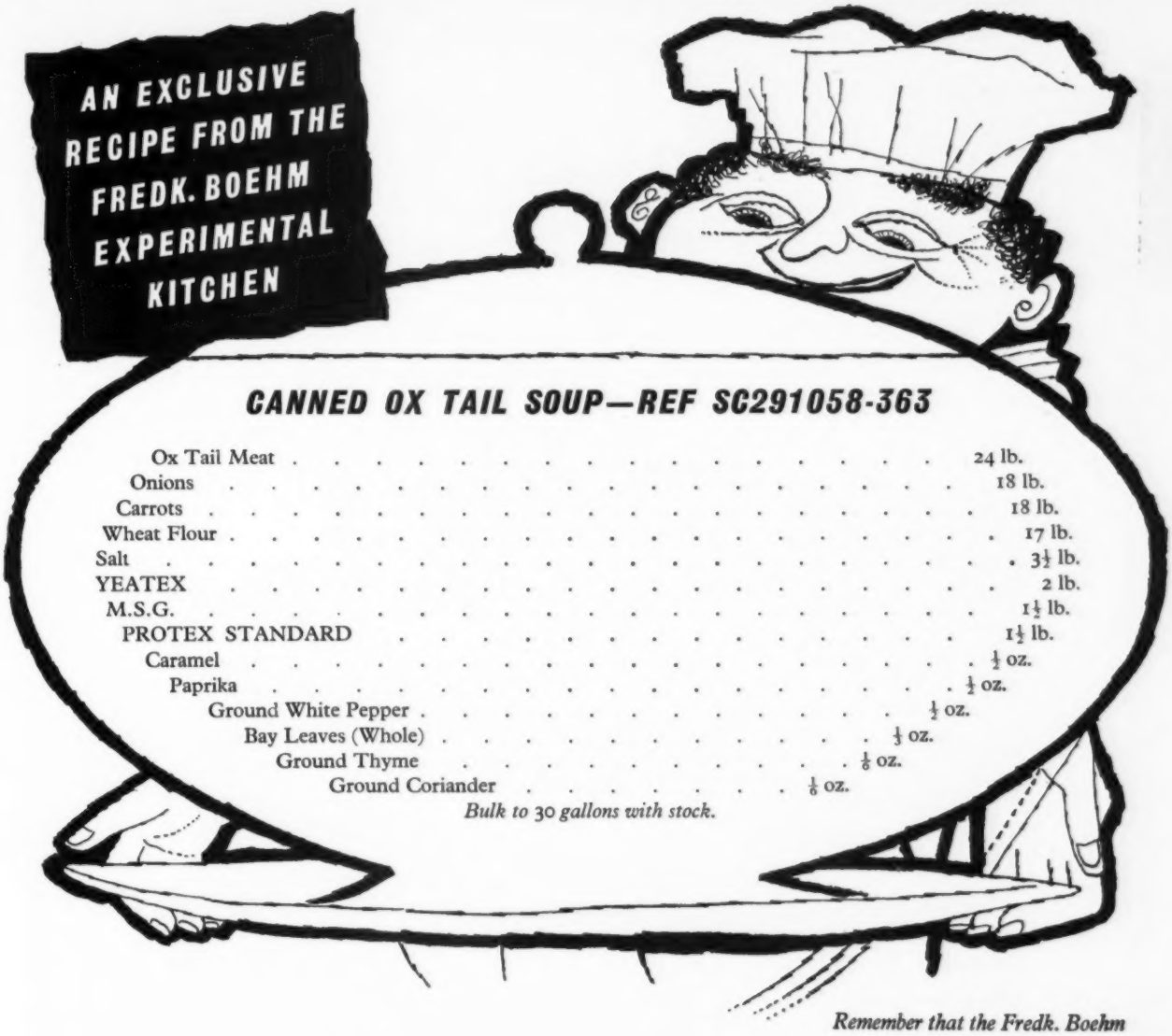

CANNED OX TAIL SOUP—REF SC291058-363

Ox Tail Meat	24 lb.
Onions	18 lb.
Carrots	18 lb.
Wheat Flour	17 lb.
Salt	3½ lb.
YEATEX	2 lb.
M.S.G.	1½ lb.
PROTEX STANDARD	1½ lb.
Caramel	½ oz.
Paprika	½ oz.
Ground White Pepper	½ oz.
Bay Leaves (Whole)	⅓ oz.
Ground Thyme	⅙ oz.
Ground Coriander	⅙ oz.

Bulk to 30 gallons with stock.

Prepare bone stock by boiling beef bones at the rate of 40 lb. per 10 gallons of water. Skim off all fat and strain before use. Bones from the Ox Tail can be used additionally, if desired. Prepare and drop the vegetables and retort in stock with the bay leaves for ½ hour at 240°F. Remove the bay leaves and pass the vegetables through a sieve to form a purée. Make a paste with rest of the ingredients (except Ox Tail Meat) and stock and add to the purée. Bulk to 30 gallons with stock, bring to the boil and simmer for 10 minutes. Place 1½ oz. of Ox Tail Meat (chopped) into each No. 1 Tall plain can and fill with hot soup. Seal, process for 1¼ hours at 240°F. and water cool.

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From the moment you start using HYPAK SPECIALLY-PRINTED CELLULOSE CASINGS, you will sell *more* sausage and cooked meat! Why? Because HYPAK SPECIALLY PRINTED CASINGS will give *your* branded product extra sales appeal right where it is most needed — in the shop window!

Oppenheimer will prepare designs, using *your* TRADE MARK, absolutely without charge, and can provide a complete range of SPECIALLY-PRINTED CASINGS for *all* your sausage and cooked meat productions.

You will find they are technically correct and just right for your needs.

Make sure of increased sales for *your* branded product and contact Oppenheimer *today* for samples and fuller details of HYPAK SPECIALLY-PRINTED CELLULOSE CASINGS.

H.C.C.1.

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THE OPPENHEIMER CASING CO. (U.K.) LTD.

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CROFTS 'RITESPEED' MOTORISED CONVEYOR PULLEYS

Check these advantages:

- A single unit, self-contained conveyor pulley with integral drive
- All driving mechanism (electric motor, speed reduction gear) housed inside the pulley itself
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- Available from stock in a variety of diameters and face widths for a wide range of conveyor speeds, for powers up to 10 h.p. Larger sizes, up to 30 h.p., on short notice
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1½ TON VAN

petrol or diesel powered

FORWARD CONTROL
all-steel body
300 cu. ft. capacity

also available NORMAL CONTROL
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- **Robust four-speed synchromesh gearbox.**
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The Packaging Manager

is crazy about

LASSO No. 76 Vinyl Tape

He says you'd have to go a long way to find a tape as good as Lasso No. 76 Vinyl Tape. He *will* keep on about it. On and on and on. "Amazing pliability," he says..."Waterproof and moisture-vapour proof," he says . . . "Pressure sensitive adhesive tape with exceptionally long storage life . . ." The Packaging Manager cannot see anyone for a while. That's right—he's tied up just now.

SEALING MACHINES DEMONSTRATED. The Lassotape Machinery Service offers a complete range of sealing machines — from hand operated dispensers to automatic machines. If you would like to see these efficient sealers and have the advice of a package sealing expert, write, without obligation, for our travelling demonstration unit to visit you.

For further information on Lasso No. 76 Vinyl Tape and other Lassotapes for the packaging industry, write to the address below.

LASSOTAPES

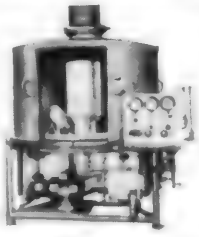
FOR ALL PACKAGING AND INDUSTRIAL USES

S&N SMITH & NEPHEW LIMITED • WELWYN GARDEN CITY • HERTS

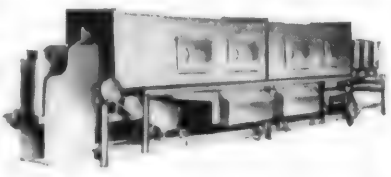
Ever seen a horse washing-up?

Yes . . . 'a horse', we said; horsepower intelligently applied to wash food cans cleaner . . . quicker . . . to economise in man-power.
There are WRIGHT HARGREAVES installations for big jobs or small . . . for jobs simple or complicated; for . . . jobs! Equipment ranges from simple, hand-fed rotary units up to fully automatic systems which include, where needed, automatic removal, washing and replacement of lids.
Whatever washing problems may confront the food industry, W.H. will solve them, either from stock or to a plan, tailored to suit your individual needs, including power conveyors with non-friction bends.

The W. H. Minor Hand Operated Rotary Food-can and Churn Washer; will wash any size or kind of can up to 12 gallons, at the rate of 300 cans per day. Simple, economical, low capital cost.



The W. H. Junior STRAIGHTAWAY Can Washer. Washes . . . sterilizes . . . containers of up to 12 gallons at the rate of from 4 to 8 cans per minute. Low consumption; easy to operate.



Our sales engineers will be happy to study your problem and to make their recommendations.

WRIGHT HARGREAVES ENGINEERING CO. LTD.

OFFICE AND WORKS: BROOKHOUSE LANE · BLACKBURN · LANCS.

TELEPHONE: BLACKBURN 4195-6 · TELEGRAMS: RITELINES, BLACKBURN.

Smee s W.H.2

The Packaging Manager is crazy about

LASSO No. 76 Vinyl Tape

The Packaging Manager is overjoyed with Lasso No. 76 Vinyl Tape. He can talk of nothing else. "Amazing pliability," he enthuses . . . "Waterproof and moisture-vapour proof," he beams . . . "Pressure sensitive adhesive tape with exceptionally long storage life . . ." Rover, wags happily to see his master so pleased. But, alas, every time that big tail swings, BANG goes another tea-cup! The Packaging Manager soon got the problem taped—and that's put a stop to *our* tale.

SEALING MACHINES DEMONSTRATED. The Lassotape Machinery Service offers a complete range of sealing machines—from hand operated dispensers to automatic machines. If you would like to see these efficient sealers and have the advice of a package sealing expert, write, without obligation, for our travelling demonstration unit to visit you.

For further information on Lasso No. 76 Vinyl Tape and other Lassotapes for the packaging industry, write to the address below.

LASSOTAPES

FOR ALL PACKAGING AND INDUSTRIAL USES

S&N SMITH & NEPHEW LIMITED · WELWYN GARDEN CITY · HERTS

We're turning out some lovely lard...

Sharples Low Temperature Rendering Process produces high quality, low-cost fats

RENDERING animal fats by the old methods is very unsatisfactory because they need a high temperature and heat can cause degradation of both the fat and the protein.

We at Sharples have spent 5 years of research and testing on this problem. The result is the Sharples Low Temperature Rendering Process which gives a premium grade fat and protein and makes big savings in operation.

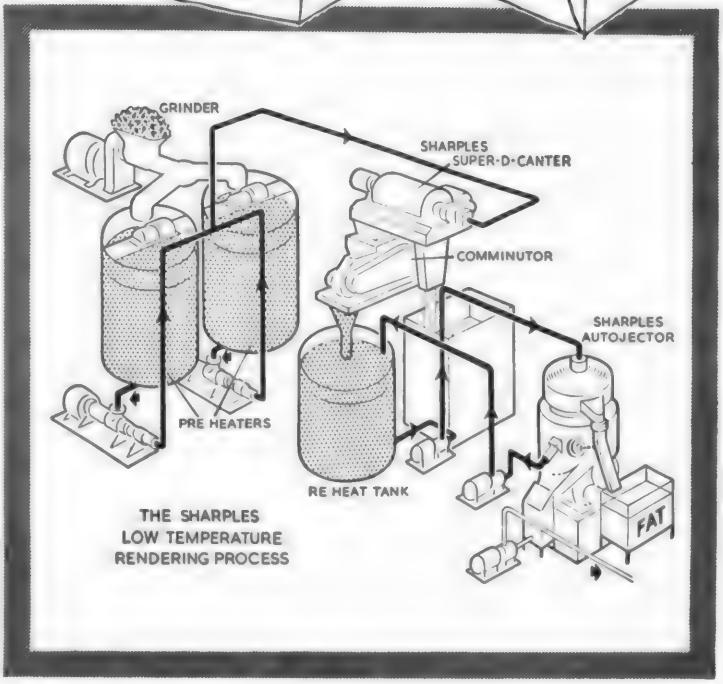
The secret is to break down the fat cells mechanically so that far less heat has to be applied to the raw fat. After grinding, the fat is heated to a moderate temperature for a short holding time to reduce viscosity and is then treated in two stages to produce a premium grade fat and a quality protein.

The Sharples Process gives an outstandingly better coloured, higher grade fat and protein which is usable for pet food or for human consumption. We confidently expect that the Sharples Process will revolutionise the economics of the animal fats industry.

This Sharples process is only one example of creative foodstuffs engineering by the Sharples organisation.

Whether it's a matter of a complete process or a single machine every plant user can avail himself of the expert advice provided by Sharples. This is backed by extensive research facilities and full size development plants.

If you have a processing problem you are invited to write to the address below or 'phone Camberley 2601 and talk to Francis Hooley about your problem. Send for Bulletin No. 1256F.



THE SHARPLES LOW TEMPERATURE RENDERING PROCESS

SHARPLES

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ENGINEERING MARINE WELDING AND NUCLEAR ENERGY EXHIBITION
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offer the most efficient method of Heating, Cooling and Pasteurising in the Food, Chemical and Process Industries.

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10. Several liquids can be treated simultaneously in the same unit.

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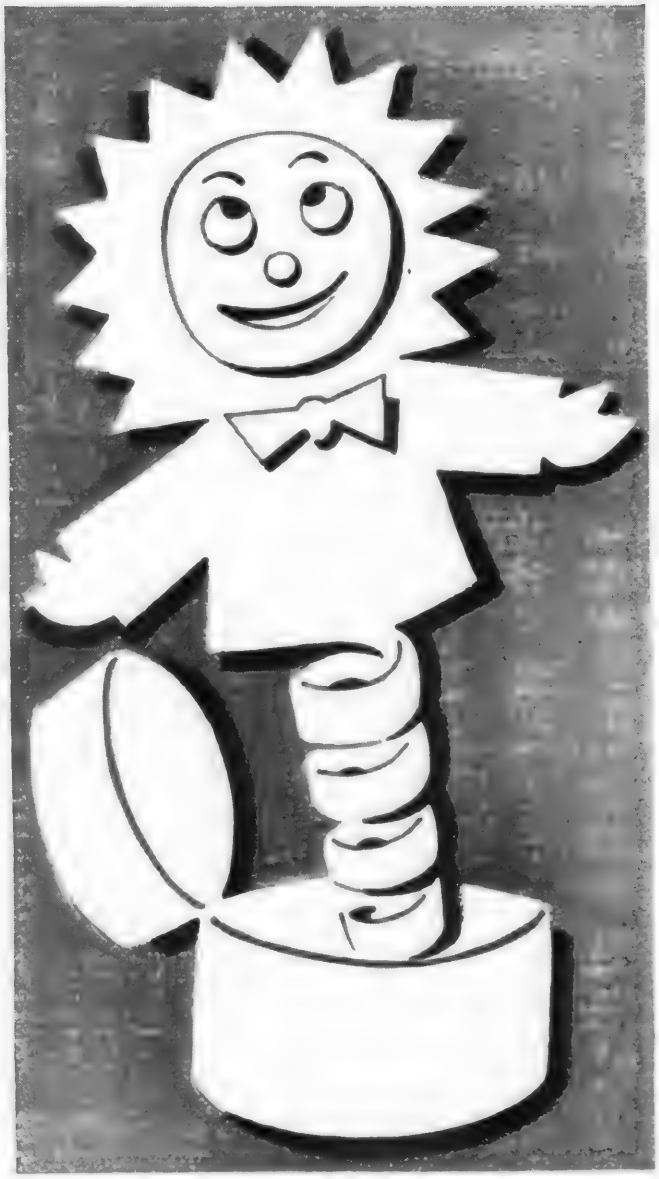
Smee's DL410



Surprise packet

There are two sorts of surprises: the nice ones and the other kind. Box-taint belongs to the latter category. Avoid it one must when packing sensitive products. It is not surprising, therefore, that wise box-makers choose SCANDINAVIAN pure folding box board. For SCANDINAVIAN, made only from virgin spruce wood pulp, has all the most desirable properties and *none* that could taint the most sensitive product. It combines lightness and whiteness with remarkable rigidity and an excellent printing surface. And (pleasant surprise) it's not so expensive as you might expect. Ask for details.

SCANDINAVIAN

PURE FOLDING BOX BOARD

'SCANDINAVIAN' PACKING FOR SENSITIVE PRODUCTS
The name 'Scandinavian' guarantees a pure folding box board produced by the associated box board manufacturers of Finland, Norway and Sweden.

Ask your boxmaker or agents of the FINNISH, NORWEGIAN AND SWEDISH FOLDING BOX BOARD MILLS
OR WRITE TO THE INFORMATION DEPT., P.O. BOX 7232, STOCKHOLM 7

CVK 20

For SPECIAL SALES APPEAL in 1959

"Derby" ½ lb. size 3⅞" dia. x 5⅛"
1 lb. „ 4 13/16" „ x 5¾"

Decorated Stock Boxes by Metal Box

An attractive container for almost every bakery or confectionery product, also for tea, can be found among the wide range of stock boxes produced by Metal Box.

Manufactured in many sizes, shapes and designs and strikingly colour printed under a hard gloss varnish, Metal Box stock boxes appeal tremendously to the customer and will bring you increased sales and goodwill.

* IMMEDIATE DELIVERY FROM STOCK! *

QUANTITIES FROM 10 DOZEN UPWARDS!

You can order as few as 10 dozen in a single design or size of Metal Box stock boxes or, of course, any larger quantity you like. Long production runs mean very reasonable prices too. Stock boxes are proven sales makers in normal distribution and can also be used for carrying out special trial schemes.

Send today for full list and prices.

"Suyin"
5¼" dia. x 2 7/16"

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POWDER FLAVOURS

The name Tru-Sil and the Padlock device is a registered Trade Mark.

BUSH

A selection from our extensive range of "Locked-in" Powder Flavours. Insist on "Tru-Sil".

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A THOUGHT FOR FOODS

Protein additions?

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GIVE US FOOD FOR THOUGHT!

MUNTON & FISON LIMITED

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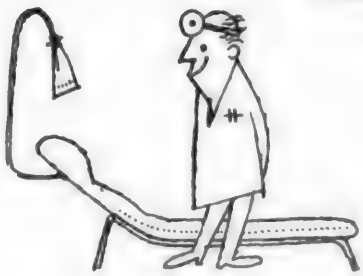
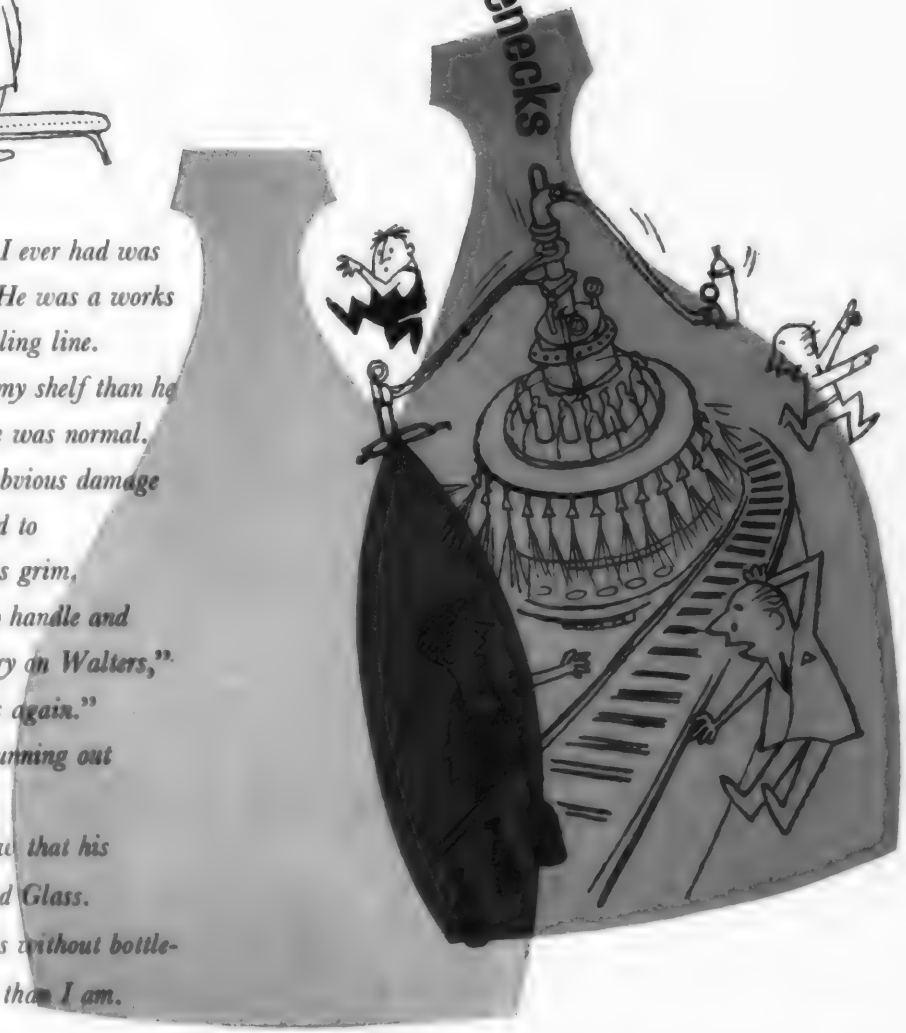
Maltsters for more than a Century

Bottles without bottlenecks



Most extraordinary case I ever had was a chap with bottle mania. He was a works manager. In charge of a filling line. No sooner saw a bottle on my shelf than he foamed at the mouth. Pulse was normal. Blood pressure down. No obvious damage to the brain. Failed to yield to normal treatment. Prognosis grim. Then I gave him a bottle to handle and he sprang to his feet. "Carry on Walters," he said. "We've got bottles again." Came out he was always running out of bottles. Cured, yes perfectly. He saw that his bottles were made by United Glass. Now he's getting his bottles without bottlenecks and he's rather saner than I am.



United Glass supplies you with bottles on time. They can do this for one very simple reason: they have eight bottle factories, enough to keep their thousands of customers fully supplied — with no delays. If you need expert advice on any aspect of glass packaging, please get in touch with United Glass. Their Glass Packaging Advisory Bureau will be glad to help you. Please write or 'phone.

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Dosage:

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with Sandvik *on the menu of the Food Manufacturer!*

Wherever food is handled in bulk, whether for packing, preparing for cooking or processing etc., SANDVIK Stainless Steel Band Conveyors provide maximum cleanliness and hygiene and help considerably to speed up production. We should welcome a discussion regarding YOUR particular problem.

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Below:—Maplewood floor treated with Evokote Type 20 at the works of John Mackintosh & Sons Ltd., Halifax

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H-W.118

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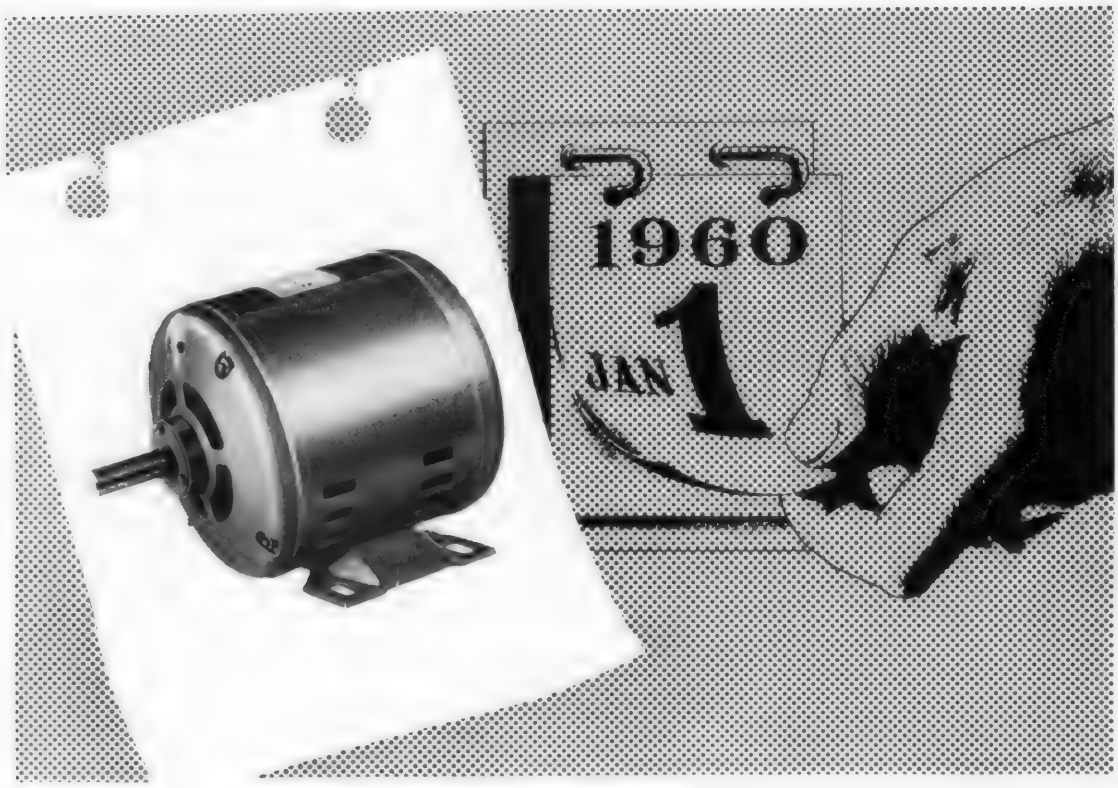

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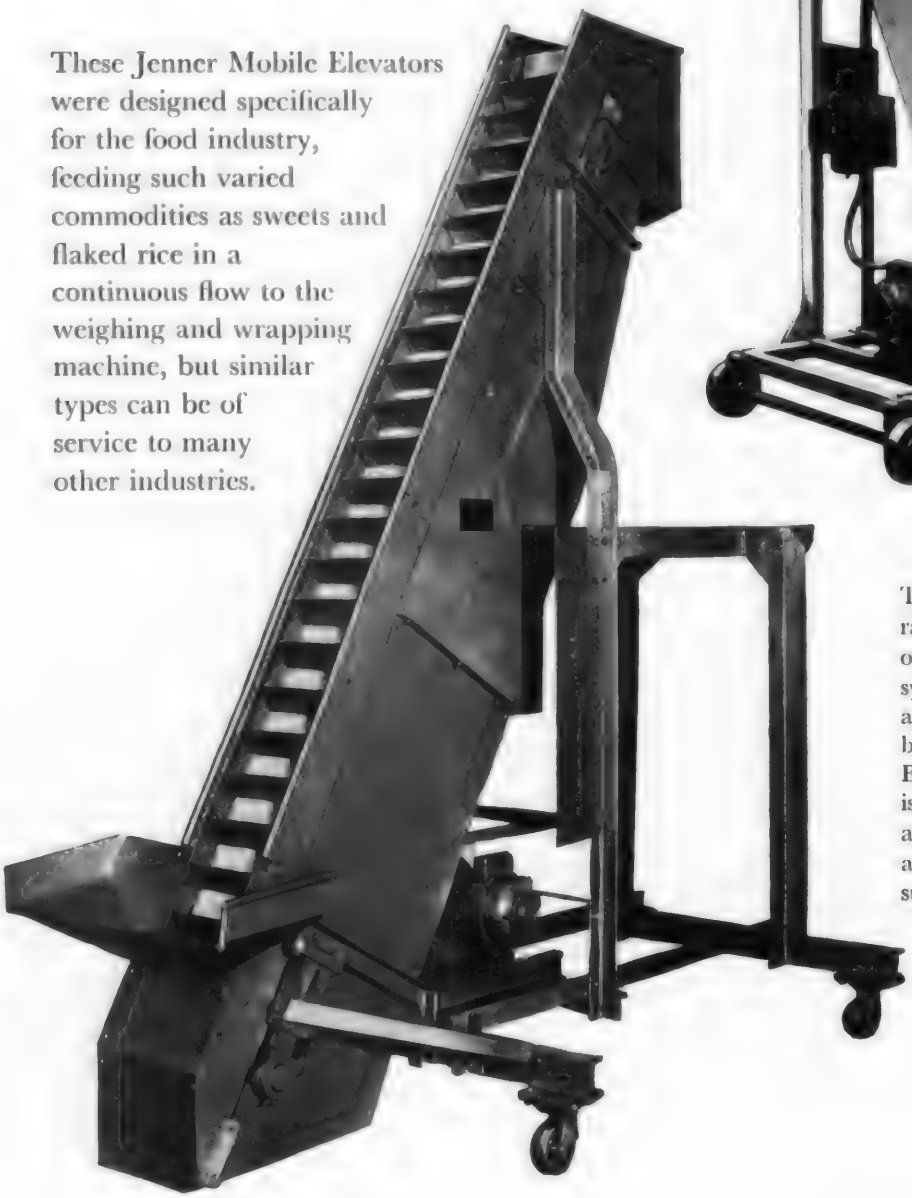
mobile elevators

These Jenner Mobile Elevators were designed specifically for the food industry, feeding such varied commodities as sweets and flaked rice in a continuous flow to the weighing and wrapping machine, but similar types can be of service to many other industries.



They may be mounted on a rail track to work with a bank of machines in operations synchronised by Jenner automatic control, or they may be entirely mobile.
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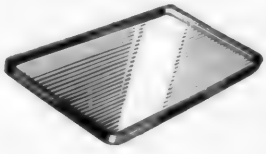

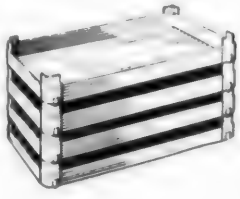

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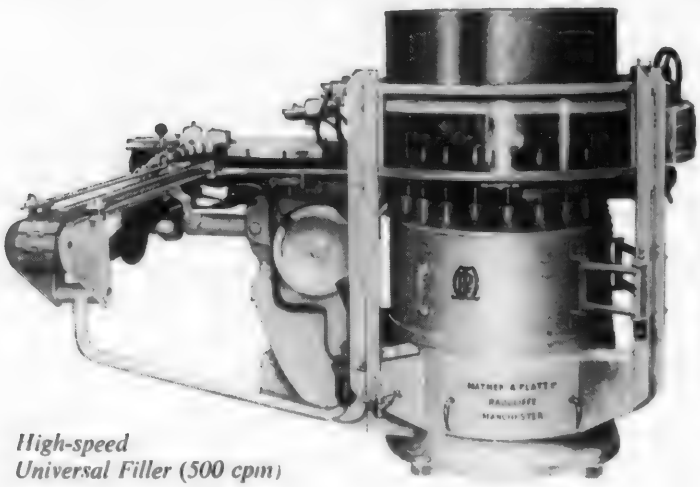
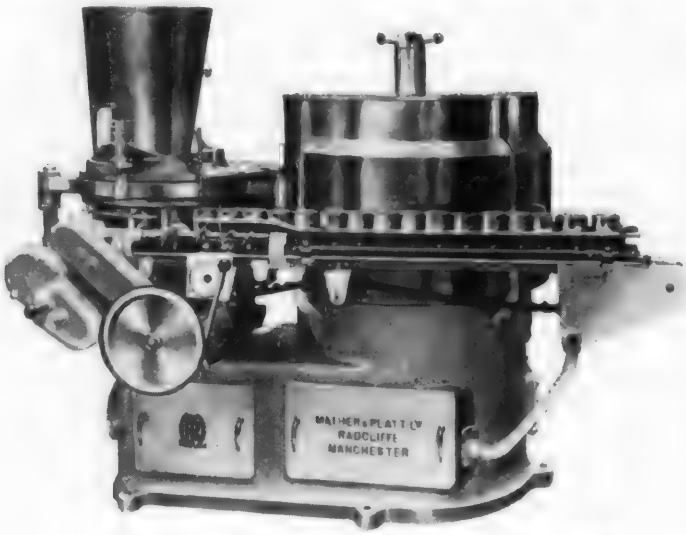


High-speed Universal Filler (500 cpm)



High-speed Solid and Liquid Filler (300 cpm)

A10 Can Filler (30 cpm)

MODERN FILLING MACHINERY

These modern machines are part of a new and complete range of designs by Mather & Platt Ltd for the canning industry.
They combine a high degree of accuracy with high speed and simple and economical maintenance.

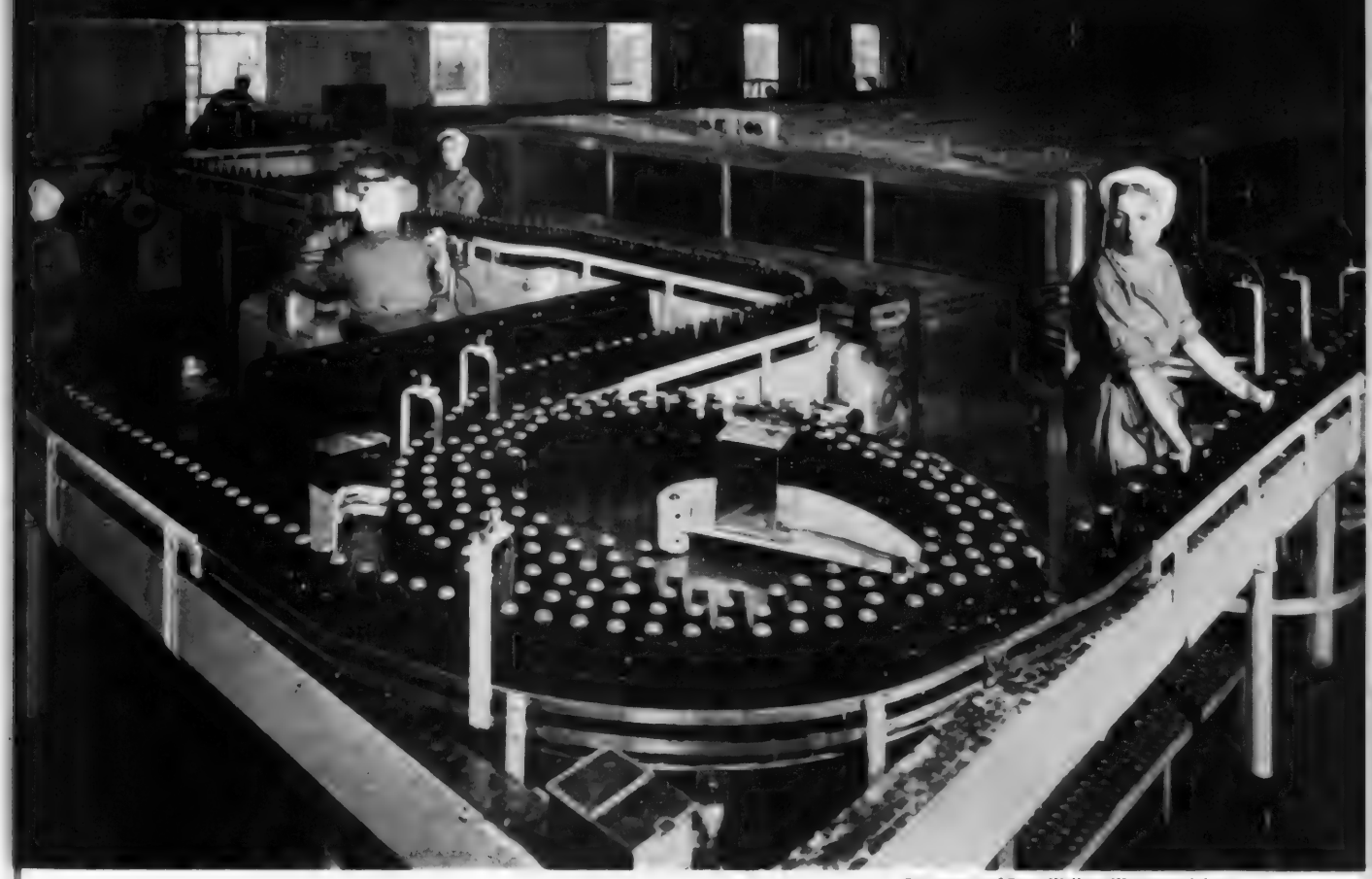
Mather & Platt
LIMITED

RADCLIFFE

MANCHESTER

606

Feeding . . . dividing . . . increased production



By courtesy of Peter Walker (Warrington) Ltd.

BARRY-WEHMILLER

Rotary Filer

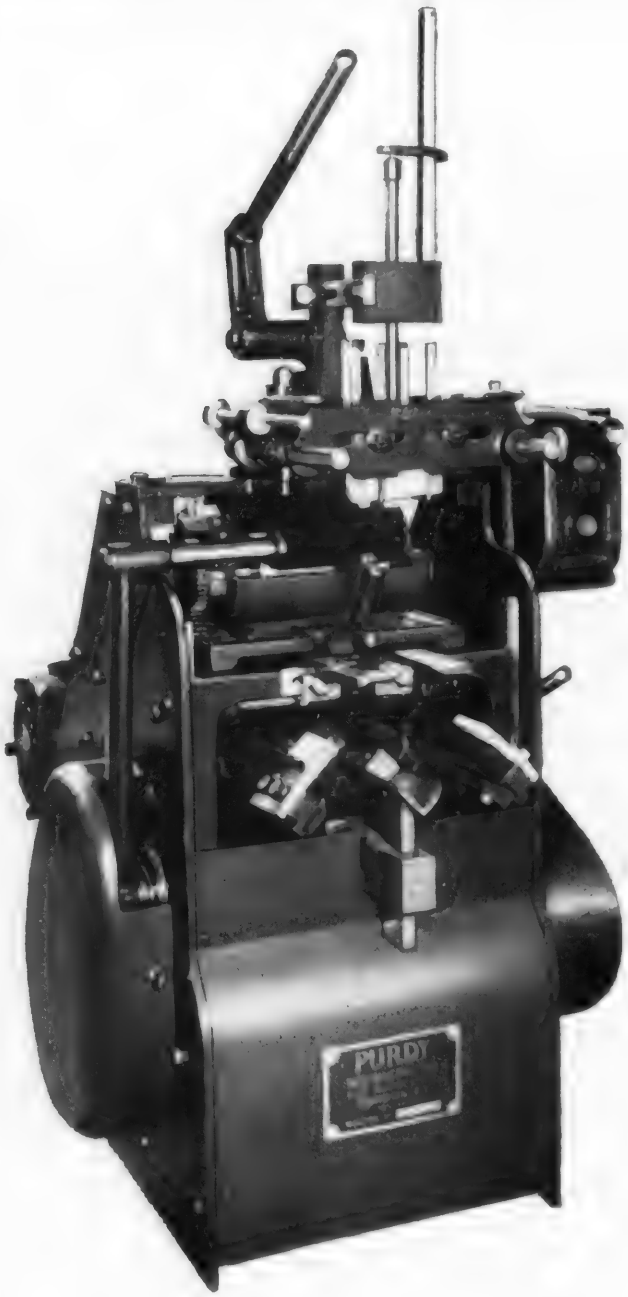
You get increased output with the B.W. Rotary Filer It steps up production, and saves labour.

If the machine ahead of the Filer stops the bottles will accumulate on the Filer table. They are automatically cleared when the machine starts again. There is no need to stop the Filer working. The Rotary Filer will handle varying sizes of containers.

BARRY BW WEHMILLER

solves the world's bottling problems

BARRY-WEHMILLER MACHINERY CO. LTD., WINGATE HOUSE, 93-107 SHAFTESBURY AVENUE, LONDON, W.1.
Telephone: Gerrard 6216 (5 lines) Telegrams: Barryweh Wesphone London Cables: Barryweh London



THE PURDY "BANTAM" BENCH LABELLER

●

or the semi-automatic bench labeller with all the virtues ! for by means of the various accessories available this machine can be made to label round, flattish, square or oval shapes, even with two different shaped labels at one and the same time. It is fitted with an independent drive $\frac{1}{4}$ h.p. motor with normal push button starter and female operators love it because they can sit whilst working.

Leaflet No. BF1/BL1.

If the articles to be labelled are fed to the operator by conveyor with conveyor take away it is, with normal type applications, well within the operators' ability to deal with up to 60 containers a minute. Intricate shapes tend to reduce output in proportion. It will handle labels up to $3\frac{1}{2}$" wide by 3" high. These limits can sometimes be slightly exceeded, it will—*Oh well, perhaps it would be easier if you send for the other details, space is so limited here!*

PURDY MACHINERY CO. LTD

41-42 PRESCOT STREET

LONDON E.1

ROYAL 8401

JACW/P.3

HAVE YOU CONSIDERED THE PACKING OF FOODSTUFFS INTO COLLAPSIBLE TUBES ?

THIS TUBE IS PROVIDED WITH
'WELTEX'
BASE SEAL ELIMINATING DANGER OF SEEPAGE AND ENSURING AIRTIGHT CLOSURE

OUR LABORATORY IS AT YOUR DISPOSAL FOR EXPERIMENTS AND DEVELOPMENT OF SUITABLE LINES.

OUR TECHNICAL OFFICE WILL ADVISE ABOUT THE MOST ECONOMICAL TUBES TO USE.

FILLING PLANT AVAILABLE AT LOW COST.

U·M·P
For Tubes and Plastics

UNIVERSAL METAL PRODUCTS LTD.
SALFORD 6 LANCS. Telephone: PENDLETON 4444
LONDON OFFICE: ARGYLE HOUSE, 29/31. EUSTON ROAD. N.W.1. TEL. TERMINUS 2073

when your product begins as a formula...

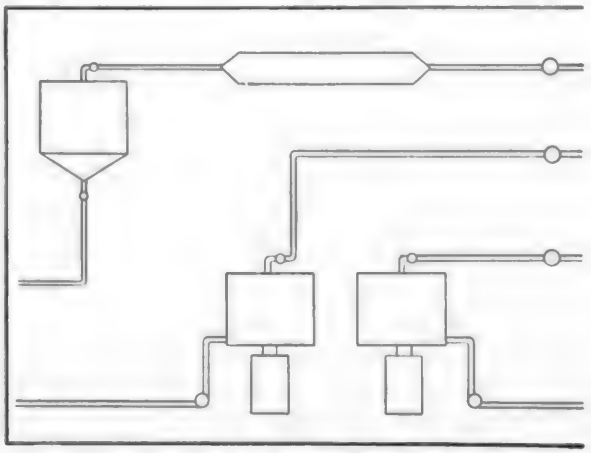
PRODUCTIVITY CALLS

FIRST YOUR FORMULA. It was born in your laboratory out of hard thinking, patient work and hopeful spending. Now it is ready to be turned into productivity and profits. Now speed comes into the picture; speed and volume. It's going to be thousands of gallons now, not pipettes full. Yet it has all got to be as precise in the factory as it was in the laboratory. Clearly a matter of measured batch dispensing and blending; a problem of process control.

THE AGE OF AUTOMATION

This was the picture we at Measurement had in our mind's eye when we were working on the Measurement *Automatic* Liquid Process Control system. Industry, we knew, would want accuracy and speed, and a modern way of applying it. An up-to-the-minute way. In this modern age the bucket is out, mainly because it excludes accuracy. Lifting and trucking must be eliminated because firstly it results in hold-ups, secondly in a waste of labour, and thirdly fatigue with its resulting fall-off in rate of production. Our equipment aims at automatically dispensing the right quantity to the right place at the right time, with all the necessary indication and records made automatically en route. The age of automation inspires sound business men to ask for the right installation for the job and no making shift. Control is the keyword.

"Backed by our years of experience", as the advertisements say (for we have been making liquid meters, pumps and electrical control apparatus for a very long time), we set about meeting this challenge. Years of research finally produced



the instrumentation that offered the flexibility which is essential, and the standardisation which makes the system an economic proposition for industry.

A FLEXIBLE SYSTEM

Today Measurement equipment is used in handling a large number of liquids in food manufacture, paper making, oil blending and chemical mixing processes. Liquids handled range from condensed milk to caustic liquors, and from benzine to beef dripping, and at Measurement Limited there is a catch phrase, "If it flows in a pipeline, then we can meter it".

ADVISORY SERVICE

We offer advice, designs and drawings to cover any complete liquid handling installation to suit any process—*your* own particular process. Given dimensional details, components can be supplied to be fitted into existing panels; otherwise we would supply complete wall-mounted or bench-mounted panels, or console models, tested and ready for installation. Servicing is a thing we regard as a duty at Measurement.

PUNCHED CARD SYSTEM

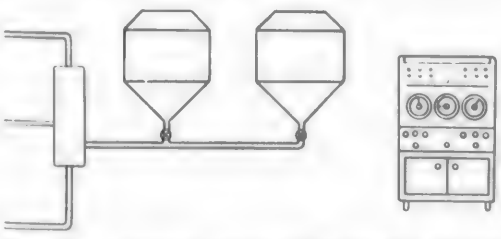
Not only does the Measurement system make Liquid Process Control merely a matter of pressing buttons, now batch delivery and blending can be completely preset and controlled by the punched card system!

SCRIBBANS-KEMP (BAKERIES) LIMITED
Control panel for automatic blending of liquids used in biscuit manufacture at the factory of Scribbans-Kemp (Bakeries) Limited, Grimsby.

FOR MEASUREMENT
LIMITED

A WIDE RANGE OF INSTRUMENTS

Whenever a liquid has to be handled, Measurement Limited make equipment to do the job, from indicating a total consumption of a liquid to the automatic dispensing, blending and mixing of various liquids.



Automatic dispensing of liquid from alternative storage tanks to a blending tank and to two rotary mixing machines. The three meters are denoted thus —○, and the three indicators are remotely mounted in a control panel with signal lamps to confirm operation of meters, valves and pumps.

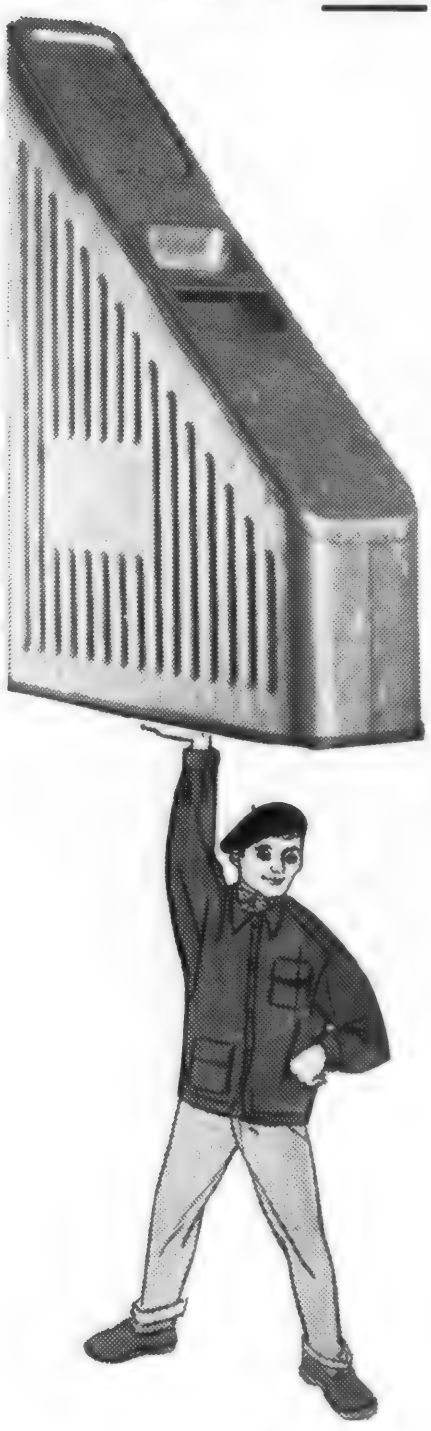
The range of products include:—

(a) Meters made in various metals and moulded materials to enable almost any particle-free liquid to be metered.
(b) Meters with small pointer type indices.
(c) Meters with small direct reading counters.
(d) Meters with resettable direct reading numeral rollers.
(e) Meters with remote reading magnetic counters.
(f) Meters with horizontal or vertical large dial instruments having resettable pointers.
(g) Meters with automatic presettable indicators that enable the operation of valves, pumps and warning devices.
(h) Complete panels with auto preset indicators, signal lamps and push buttons for wall mounting or free standing.
(i) Schemes involving a number of meters dispensing liquids to one outlet.
(j) Schemes where a number of liquids are dispensed through one meter.
(k) Automatic actuation of metering equipment by photo-electric cell or contact operating devices.
(l) Complete panels incorporating mimic diagrams.
(m) Complete auto preset equipment that could be preset by a punched card reader unit.

★ *You may be tempted to tear out this advertisement for reference. Well, it's always a pity to spoil a book: get your Secretary to drop us a card and we'll gladly send you a reprint of these pages. A letter with more detailed requests will, of course, receive more detailed attention. Write to:—*

MEASUREMENT LIMITED
TAMESIDE WORKS DOBCROSS, NR. OLDHAM, LANCS.
Telephone: Delph 424 (5 lines) *Telegrams:* Supermeter Dobcross
MEASUREMENT ENGINEERING LIMITED P.O. Box 2305, Wellington C.I.
PARKINSON COWAN (S.A.) (Pty.) Ltd. P.O. Box 1113, Johannesburg
Export Enquiries to: Parkinson Cowan Group Exports Ltd., Terminal House, Grosvenor Gardens, London S.W.1.
Telephone: SLOANE 0111/4 *Cables:* DISC London

THEY CAN CAN COAL IN FRANCE



Charbonnages de France (the French coal authority) have found a clean, easy way to deliver coal—by packing it in corrugated sheet steel. This pack is a triangular jerrican holding 33 pounds of coal. The coal is delivered in the can, to be tipped from it straight into the stove or grate, thus avoiding the dusty, dirty shifting of coal from sack to cellar to scuttle to fire.

"BULLY"

This is only one example of the versatility of sheet steel as a packaging material. Ever since the early 19th century tinplate (which is sheet steel with a protective coating of tin) has been the premier pack for food. Without such stand-bys as bully-beef and dried milk, Great Britain would have been starved out by the rigorous blockades of two world wars. And today, despite much competition from new materials, tinplate maintains its pre-eminence as a food pack. No less than 3,500 million cans of food were marketed last year. There isn't a larder in the country that doesn't contain half a dozen tins "just in case."

THE FUNCTIONS OF THE IDEAL PACK

Food, being highly perishable, needs efficient protective packing to retain freshness. That is where tinplate comes in. More than any other material, tinplate fulfils all the functions of the ideal pack.

Tinplate affords complete and permanent protection to the product against climate, contamination and decay (a tin of beef 87 years old has been opened and found perfectly fit for consumption).

Because tinplate takes colour-printing as brilliantly as art-paper it is an excellent medium for establishing product identity. This characteristic of tinplate is increasing in importance as the popularity of supermarkets increases.

But the advantage of a tinplate pack most attractive to traders and the buying public is its convenience. A tin is easy to transport, easy to handle, easy to store, easy to open and easy to dispose of. For all forms of perishable goods, tinplate as a pack has no equal.

TINPLATE—THE PACKAGING MATERIAL OF THE FUTURE

There is little doubt that tinplate will maintain its lead as a packaging material. Its many great advantages—already known—are being still further developed by The Steel Company of Wales, who make two-thirds of Britain's tinplate.

It has always been the policy of The Steel Company of Wales to pay particular attention to customers' specific problems, and to ensure that its products are "tailor-made" to individual requirements. If you have a packaging problem it will be worth your while to write to us or telephone Swansea 51571. We believe we can help.

THE STEEL COMPANY OF WALES LIMITED

Tinplate Division, Carmarthen Road, Swansea, Glamorgan · *Phone: Swansea 51571 · Telegrams: Welshplate, Swansea*

NO DIRTY LOOKS

Permutit softened water ensures:

- Sparkling bloom-free clean bottles
- Efficient operation of bottle washing machinery
- No unnecessary re-washes
- Reduced maintenance costs

Permutit Fully Automatic and Manually operated Softeners are available to soften any volume of water.

THE PERMUTIT COMPANY LIMITED

DEPT. W.L. 332, PERMUTIT HOUSE, GUNNERSBURY AVENUE, LONDON, W.4 · TELEPHONE: CHISWICK 6431

Subsidiary Companies

THE PERMUTIT CO. OF AUSTRALIA PTY. LIMITED
567-573, Pacific Highway, Sydney, N.S.W.

★

THE PERMUTIT CO. OF SOUTH AFRICA (PTY.) LTD.
P.O. Box 6937, Johannesburg

ION EXCHANGE (CANADA) LTD., 33, Price Street, Toronto 5, Ontario

HERE'S MORE PROFIT FROM HAMBURGERS & PATTIES

The HOLLYMATIC way

See it and you'll believe it! Up to 2,100 patties or Hamburgers an hour, exactly the size and shape you want, can be produced by the amazing new Hollymatic.

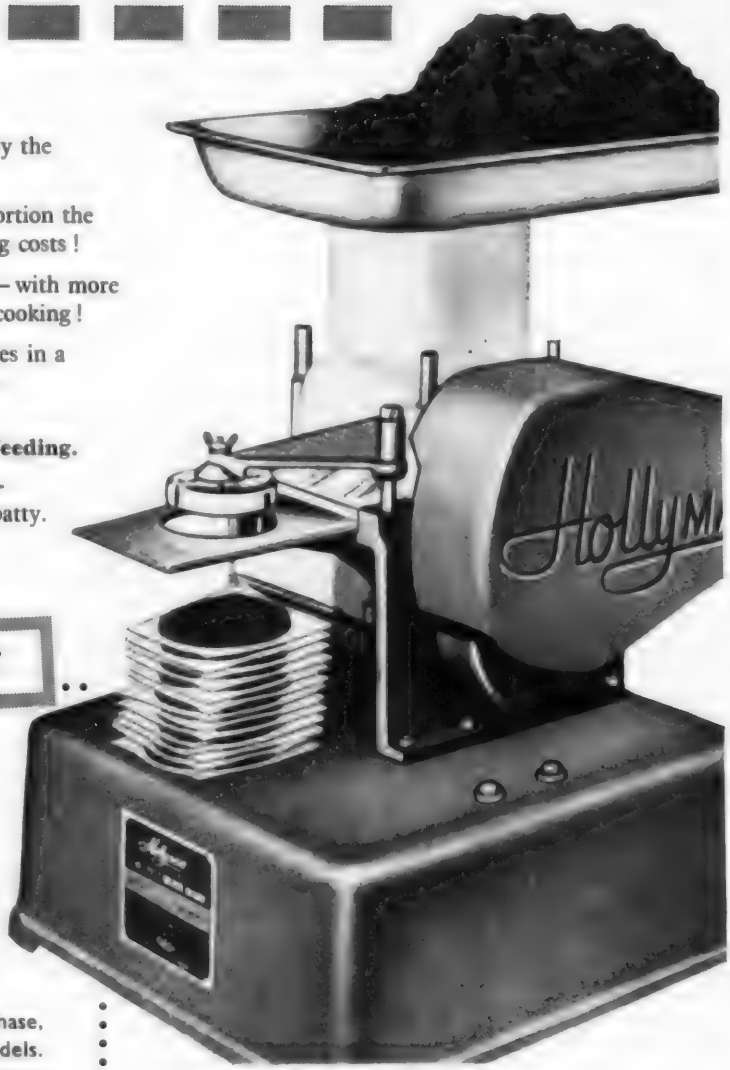
Gives ABSOLUTE PORTION CONTROL — each portion the size you decide on, so essential in controlling costs!

Produces MORE PATTIES per pound of meat — with more succulent texture, less shrinkage and faster cooking!

SAVES TIME AND LABOUR — by moulding patties in a great variety of materials and stacking them automatically on paper.

* **Only Hollymatic gives Automatic Paper Feeding.**

The only patty moulding machine that automatically feeds the patty paper under each patty. Eliminates manual work and allows you to use the most advantageous sheet size.



SPECIFICATIONS

PATTY SIZES AND SHAPES
Standard shapes are round or square. Equipment to make odd shapes available at additional cost. A separate hopper bottom is required for each thickness of mould plate used; these may vary from $\frac{3}{16}$" to $\frac{3}{4}$" and can be changed quickly and easily.

ELECTRICAL SPECIFICATIONS
Equipped with a $\frac{3}{4}$ h.p. Capacity type, single phase, 60 cycle motor, in either 110 or 220 volt models. Three phase, direct current, 50 or 25 cycle motors can be supplied at additional cost.

DIMENSIONS
The Hollymatic is 26$\frac{3}{4}$" long x 18$\frac{1}{4}$" wide by 27$\frac{3}{4}$" high.

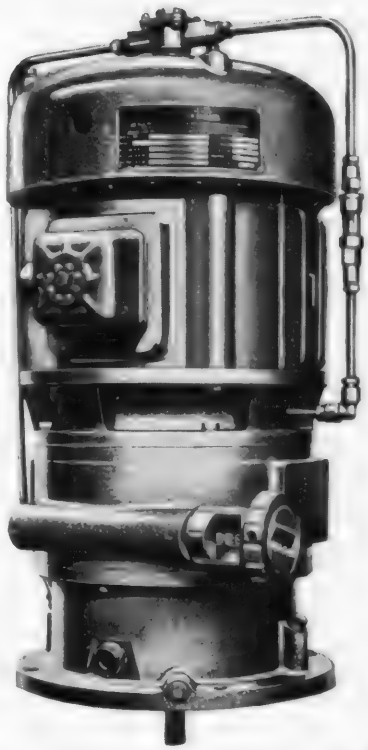
WEIGHT
The Hollymatic weighs 180 lbs. complete.

Write for details or Telephone

STOKES & DALTON LTD
VICTORIA SPICE MILLS, LEEDS, 9
Tel: Leeds 31701 (10 lines)

NEW VERTICAL
VARIABLE SPEED GEAR

- Particularly suitable for stirring and agitating applications.
- Self-contained lubrication system.
- The danger of oil leaks has been eliminated by the use of a special flinger arrangement which will not deteriorate in service.
- Available in sizes ¼ to 5 H.P. with standard stepless speed variation over a 9 to 1 output speed range.
- The motorised unit illustrated can be supplied with input speeds of 960 or 1440 r.p.m. giving output of 320 to 2880 and 480 to 4320 respectively. Lower output speeds are obtainable by fitting flange mounted reduction gears to the output shaft.
- Units can also be supplied with the output shaft uppermost.



ALLSPEEDS LIMITED

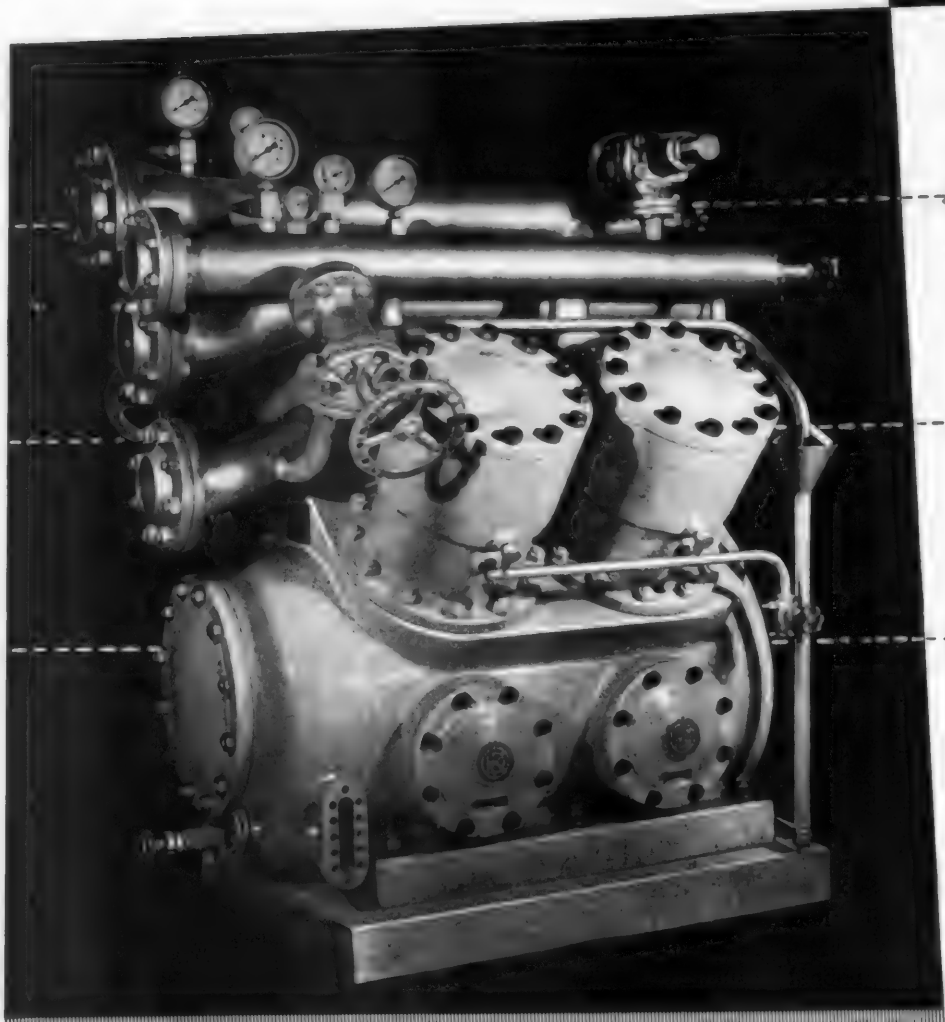
75 Oakenshore Works · Clayton-le-Moors
Accrington, Lancs.
Telephone: Accrington 5441 (4 lines)

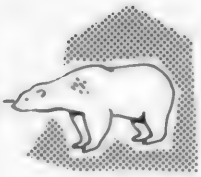
Kopp

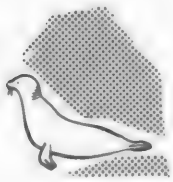
SEE OUR EXHIBITS ON STAND No. 4, NATIONAL HALL GALLERY—ENGINEERING, MARINE WELDING & NUCLEAR ENERGY EXHIBITION, OLYMPIA. 18th – 30th APRIL

LONDON: 59 PARK ROAD NORTH, ACTON, W.3. TEL. ACORN 7150
SCOTLAND: P.O. BOX No. 1, CLARKSTON, GLASGOW. TEL: BUSBY 2738
MIDLANDS: MUCH PARK STREET, COVENTRY. TEL: COVENTRY 63091
YORKSHIRE: 46 PARK SQUARE, LEEDS, 1. TEL. 3-1146, 3-0285/6

Compressors for Cooling Equipment







Up-to-date and efficient ammonia compressors for cooling equipment of every type and description for refrigerating plants, deep freezing plants, slaughter houses, breweries, and chemical works of well tried ČKD make.

TECHNOEXPORT

TECHNOEXPORT, Foreign Trade Corporation for Export of Complete Industrial Plants Prague, Czechoslovakia.

5 OF THE BEST...

These five materials were developed to meet customers' special requirements.

LET OUR TECHNICAL SALES DEPARTMENT HELP YOU!

Phone for our representative to call and see you.

FISHER'S FOILS

FISHER'S FOILS LTD. EXHIBITION GROUNDS, WEMBLEY, MIDDLESEX, ENGLAND

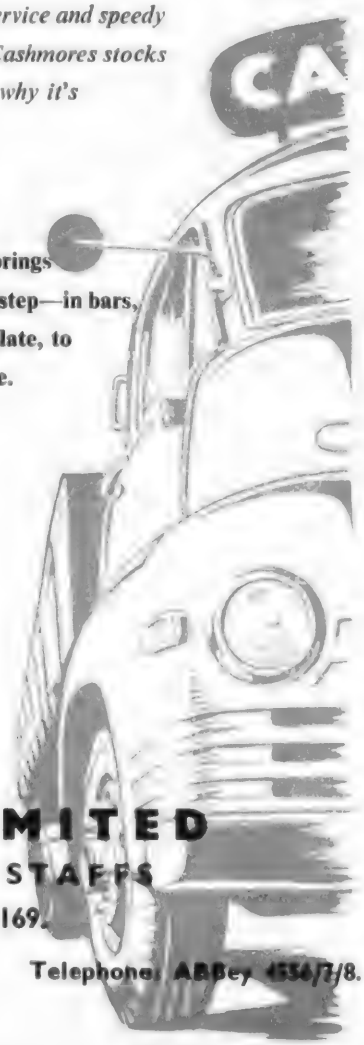
TELEPHONE: WEMBLEY 6011 *GRAMS: LIOFNIT WEMBLEY*

"... but STAINLESS STEEL *is* CHEAPER this way!"

"Cashmores hold the stocks *and* carry the financial burden – whilst I use valuable floor space for production. And, what's more, there's no need for me to worry about losses on redundant stock".

"With their new TELEX service and speedy delivery fleet you can say Cashmores stocks are my *stocks – and that's why it's cheaper all round!"*

A call to CASHMORES brings STAINLESS to your doorstep—in bars, flats, hexagons, sheets or plate, to specifications in general use.



CASHMORES

JOHN CASHMORE LIMITED

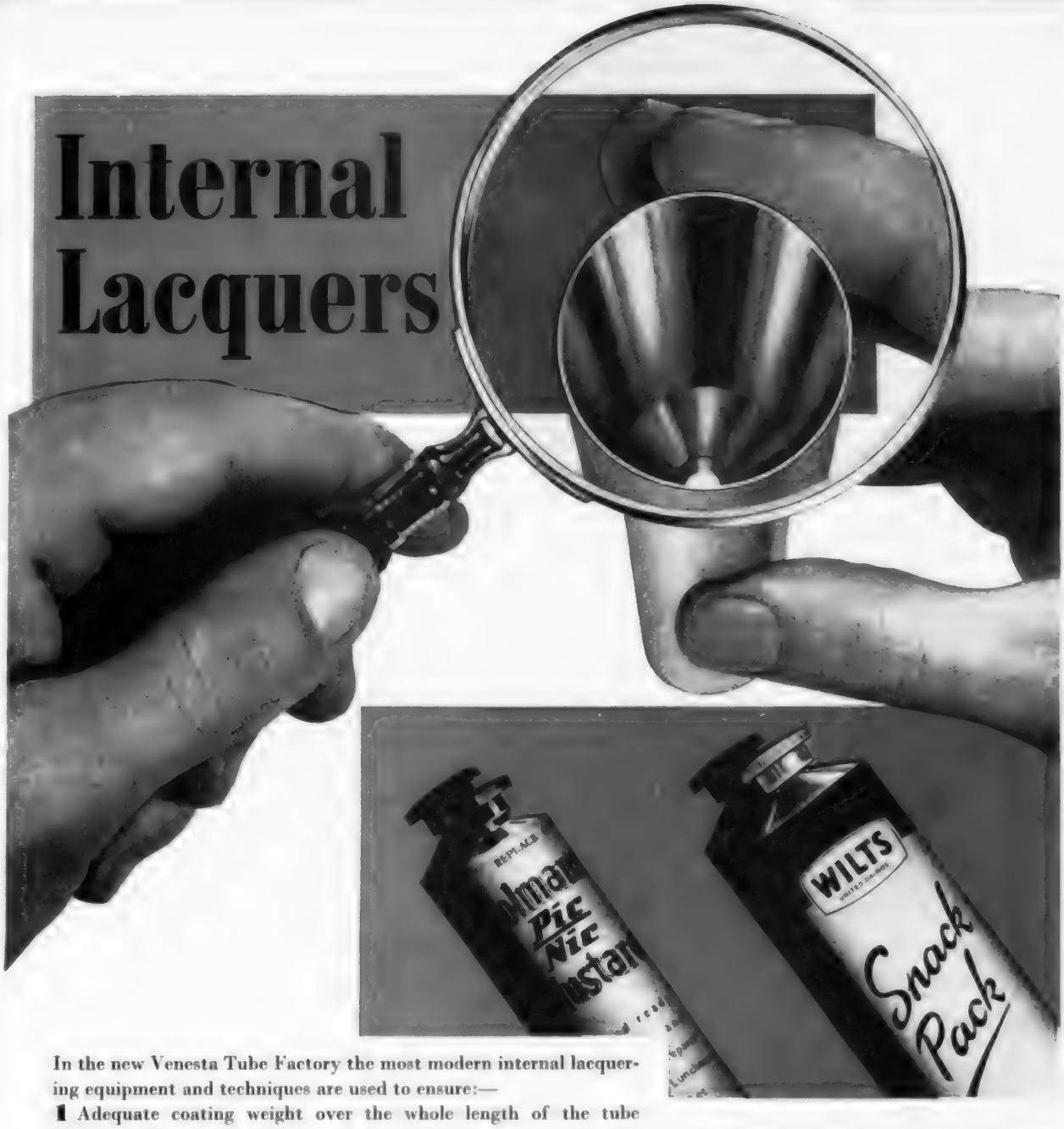
GREAT BRIDGE · TIPTON · STAFFS

Telephone: Tipton 2181/7. Telex: 33-169.

London Office: Artillery Mansions, 75 Victoria Street, London, S.W.1. Telephone: ABBey 4556/7/8.

SM/JC SS.

Internal Lacquers



In the new Venesta Tube Factory the most modern internal lacquering equipment and techniques are used to ensure:—

1 Adequate coating weight over the whole length of the tube including the nozzle interior.

2 Continuity of coating to avoid danger of exposed metal.

3 Adhesion to the tube walls and maximum flexibility to prevent cracking and flaking during use.

A comprehensive Laboratory service is available to test customers' products and determine the most suitable type of internal lacquer, should it be required.

Consistently good

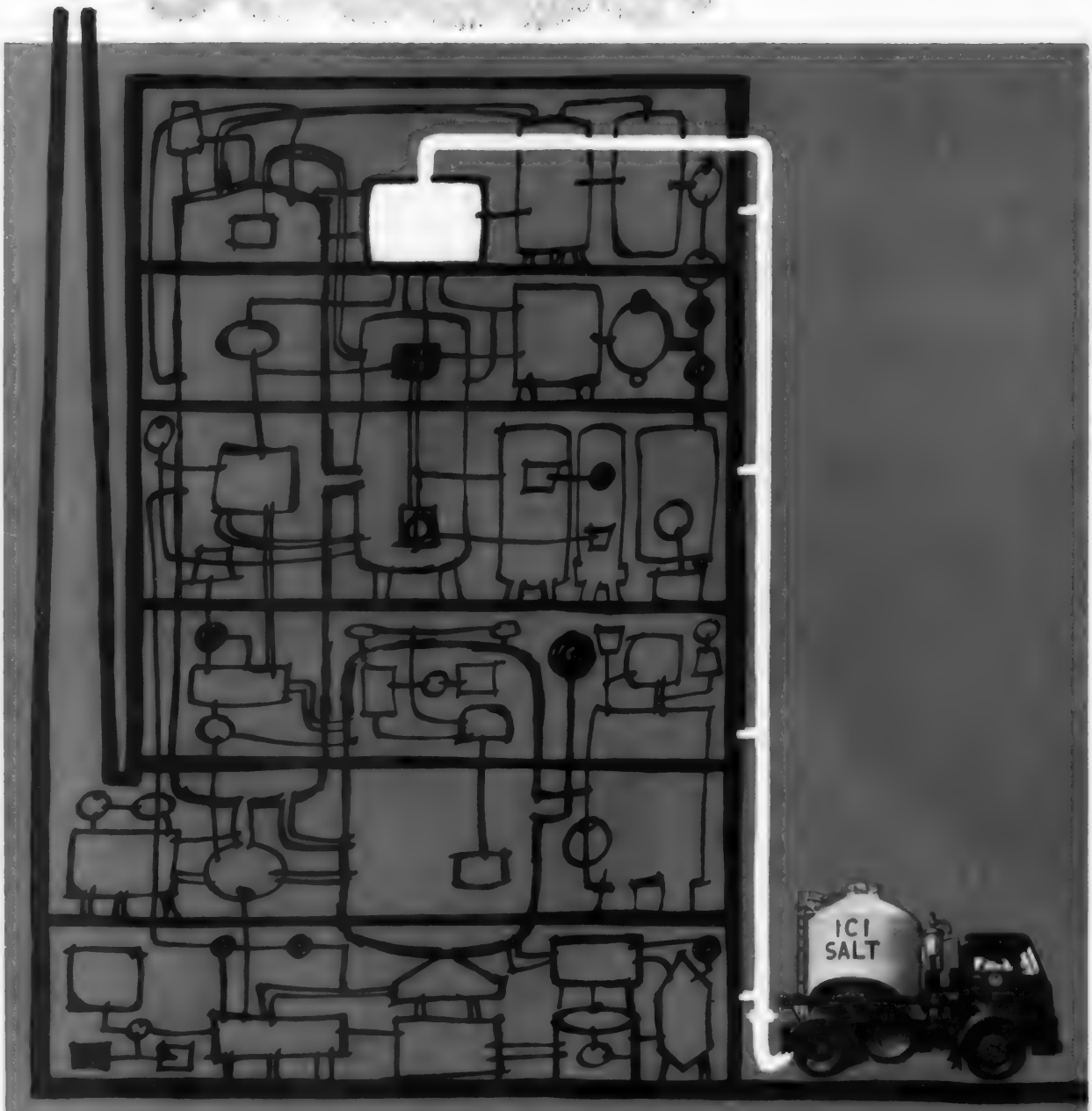
Venesta *tubes*

VENESTA

A product of the Venesta Foil Division

VENESTA LIMITED · FOIL DIVISION · VINTRY HOUSE · QUEEN STREET PLACE · LONDON EC4 · Telephone: CENtral 3040

TA



Straight to the point

No matter how awkwardly your brine-making equipment is placed, I.C.I. salt by pipeline goes straight to the point. One of I.C.I.'s special air-discharge vehicles can replenish your saturator with 7 tons of Pure Dried Vacuum Salt in 30 minutes. There are no packages to be paid for, no manhandling costs and no risk of contamination.

* If you use brine for preserving meat or vegetables, or indeed for any other purpose, write for free copies of the booklet 'Salt by Pipeline.'

IMPERIAL CHEMICAL INDUSTRIES LTD., LONDON, S.W.1

GRILL FLOORS at TATE & LYLE LTD. LIVERPOOL

Safe foothold is assured in Tate & Lyle's Liverpool refinery by GRILL FLOOR flooring. Its open, non-slip surface sheds liquids, is easily cleaned and does not harbour dirt. On the stairways GRILL FLOOR stair treads and handrailing provide a sure footing.

GRILL FLOOR stair treads at Tate & Lyle's Liverpool refinery.

Tate & Lyle's Liverpool refinery, flooring and handrailing by GRILL FLOORS

GRILL walkways

FOR: POWER STATIONS · OIL REFINERIES · GAS WORKS · CHEMICAL PLANTS · WATER WORKS · FOOD PREPARATION PLANTS · COAL WASHERIES · AIRCRAFT INDUSTRIES · CEMENT WORKS · MATERIAL HANDLING PLANTS, ETC. ETC.

GRILL FLOORS LTD LONDON W.10

P757

THE HEART OF THE MATTER

Plenty positive displacement pumps are suitable for almost all food and chemical processes. They can be supplied with fixed or variable and reversible capacity; and with Servo or automatic control. Illustrated is a special pump designed to the Milk Marketing Board's requirements. Fitted with a mechanical seal, this pump can be completely dismantled for thorough sterilizing in less than a minute without any tools. It is as easily and quickly reassembled.

PLENTY & SON Ltd.

NEWBURY, BERKS

TELEPHONE: NEWBURY 2363 (4 lines)
TELEGRAMS: PLENTY, NEWBURY F.M.

Presented with pride!

Seal your pack with "Viskrings" and establish confidence between you and your consumer. YOU can be confident that your bottling will reach the consumer perfect and intact. The CONSUMER will be confident that the contents are genuine and as expected—a fine product, perfectly presented. Seal all stoppered and screw-capped bottles with "Viskrings". There is a "Viskring" to fit every bottle neck, available in a wide range of colours. "Viskrings" can be printed with your brand symbol. Send your container complete with primary closure to us for fitting. We will return it with samples and quotations for any quantity.

- "Viskring" can be applied rapidly by hand—no machinery is necessary.
- They are self-adjusting.
- They prevent the blowing or riding of stoppers.
- They prevent the movement of screw caps once they are tightened.
- They afford protection for branded products and reduce pilferage and evaporation.
- CELLULOSE CLOSURES . . . Contain No Metal . . . Require No Adhesive.

for your Sales sake fit "Viskrings"

THE VISCOSE DEVELOPMENT CO. LTD.

40 CHANCERY LANE, LONDON, W.C.2 Telephone: CHAncery 8111 Telegrams: Viskap Westcent London VC/4

Heating or Cooling

You may not want hell fire, but you do want efficient heating and cooling—viscous fluids can now be continuously processed by the ROTAPRO. Heating may be by hot water or steam, and cooling by water, brine, or direct evaporating refrigerant, the product surfaces are sanitary, easily cleaned and resistant to corrosion.
Where the product has to pass through a wide viscosity range, the ROTAPRO can be used in series with Clarke-Built plate heat exchangers, this equipment has a wide range of uses, and we suggest you write to us for details—the address is below. ROTAPRO is a registered trade mark.

CLARKE-BUILT LTD

Clarke-Built Limited,
Power Road, Chiswick, London W4. Telephone CHiswick 7631 (7 lines). B

Dinkum — an OVERALL regard for hygiene

STYLE No. 3481

100%—4oz. NYLON TAFFETA OVERALL

SW 45 in.
W 46 in.
WX 47 in.
QS 48 in.
XOS 49 in.

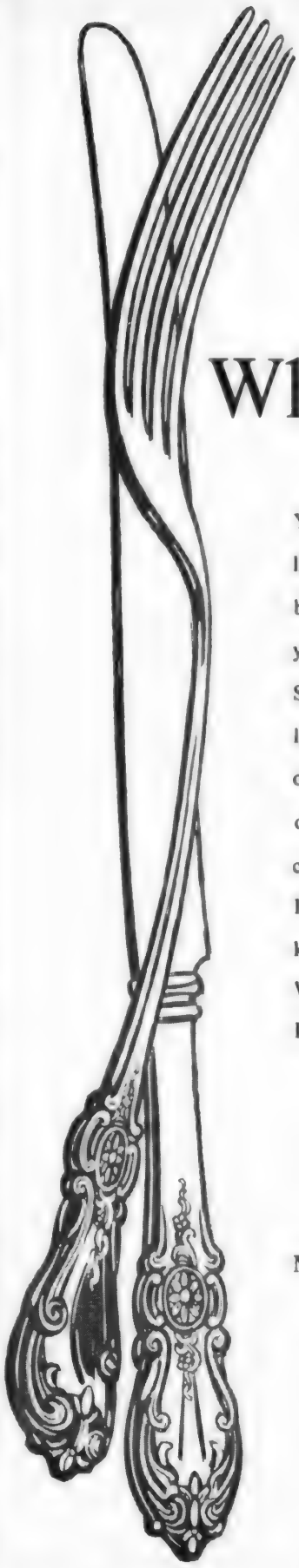
Long sleeve, button front, rever collar, two pockets, buckled stiffened belt. Wine, Reseda, Rifle, Green, Saxe, Pink, Turquoise, Navy, White, Lemon, Lilac.

Dinkum

EFFICIENT OVERALLS

ANGUS JOWETT & CO LTD

SKELTON INDUSTRIAL ESTATE,
SALTBURN-BY-THE-SEA, YORKS.
Telephone: Skelton 451/2 *Established 1911.*



Who is a gourmet?

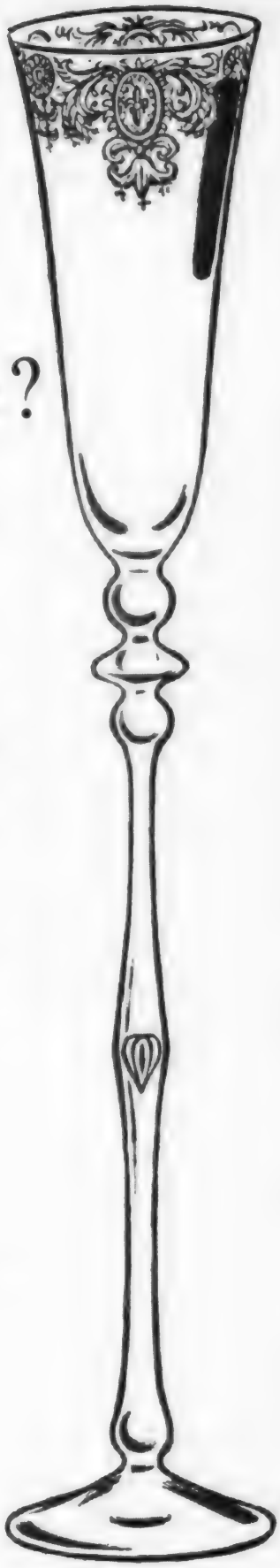
Your customers are. They enjoy good flavours. They like the taste of your products, that is why they keep on buying them. It is most important to them and you that your flavours remain the same.

StaffordAllens are making flavours today on which leading manufacturers have built up world-wide sales of now famous products over a period, in some cases, of twenty or thirty years. For consistent flavours you can rely on StaffordAllens.

For new flavours, too, StaffordAllens have a happy knack of hitting that popular, mass-market appeal. Why not consult Stafford Allen & Sons Ltd., Wharf Road, London, N.1, Telephone: CLErkenwell 1000?

StaffordAllenS

MAKE SPECIALLY GOOD FLAVOURS



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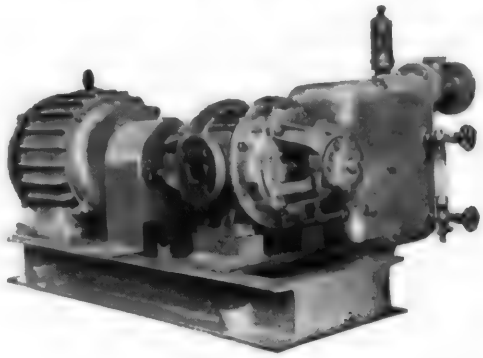

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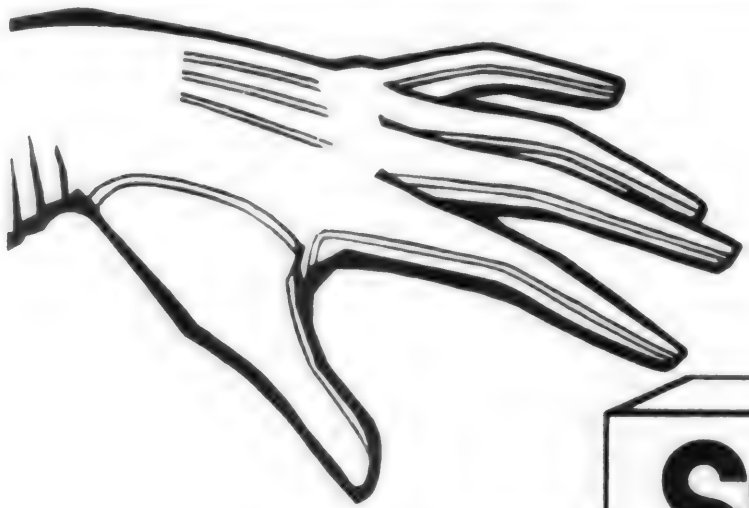

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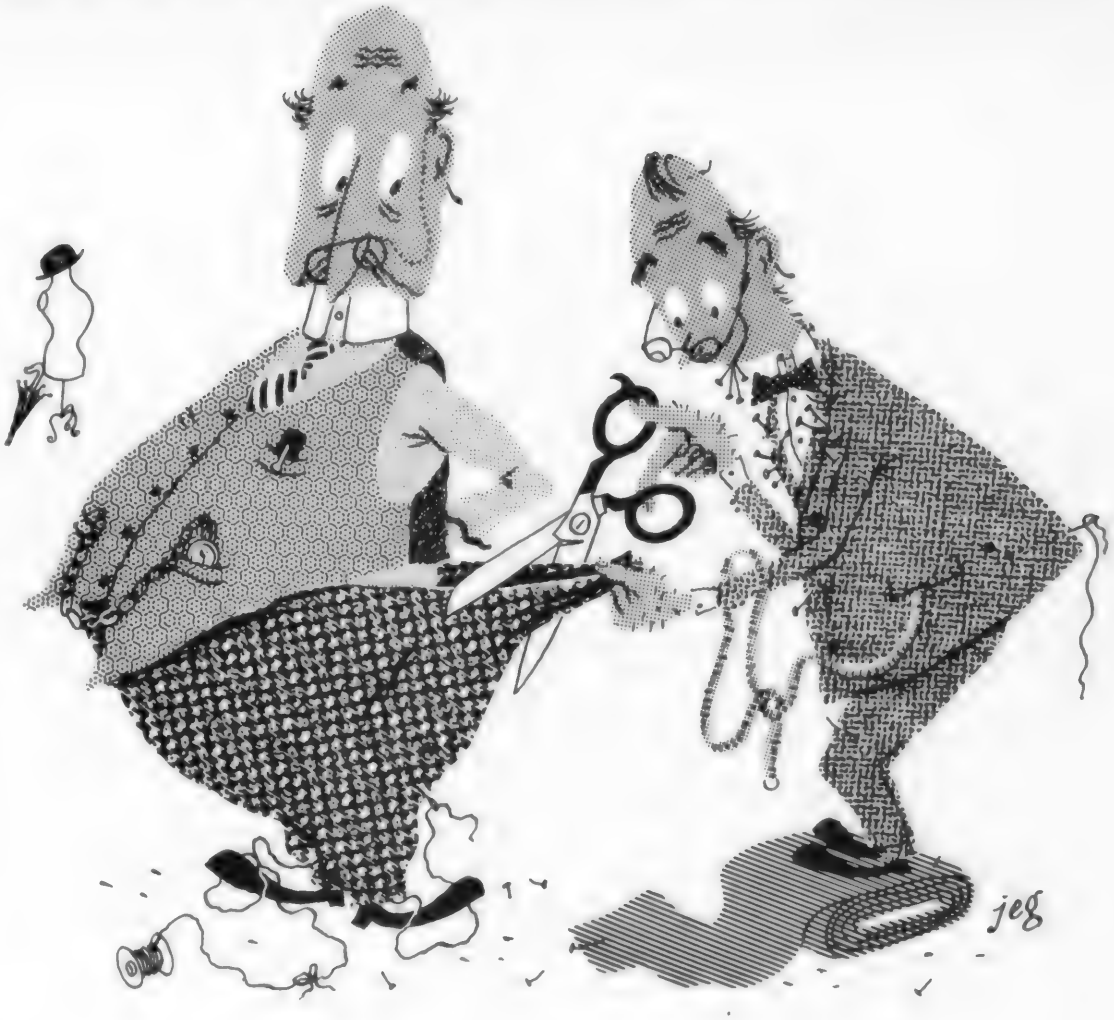

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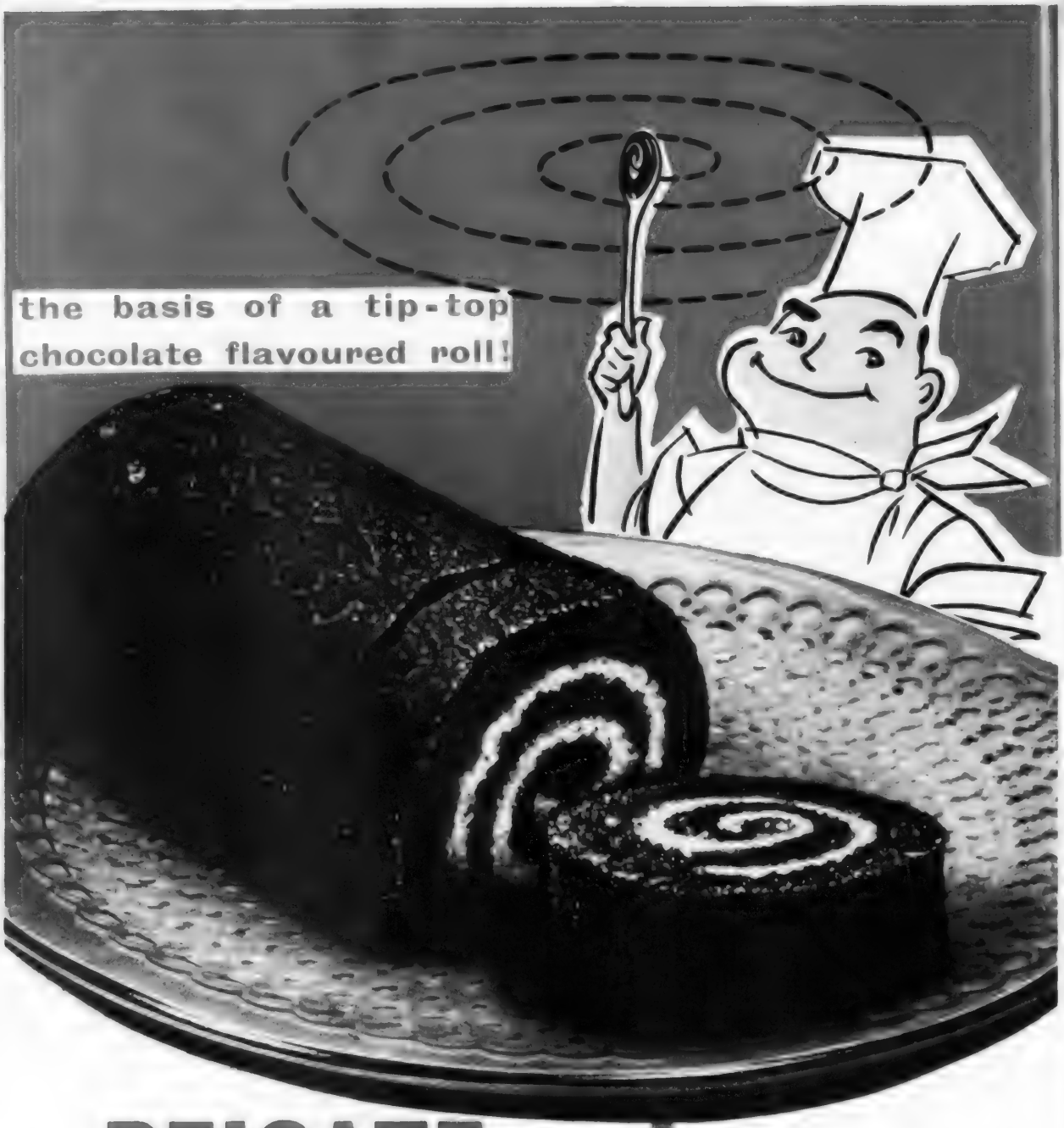

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Sample free.

Use ¾ oz. per 1 lb. of Swiss Roll

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The 'Model Fifty' range offers all the advantages of the Benjamin 'Saaflux' system, *plus* improved lampholders, reflector beads and dustproof 'Visor' covers.

ONLY FIVE 'SAAFLUX' LAMPHOLDER ASSEMBLIES
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Only one BC for all reflector types up to 150W.

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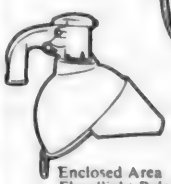
Glassteel diffuser

'R.L.M.' reflector with 'Visor' Cover

Stock Bin unit



Enclosed Area Floodlight Pole Top.

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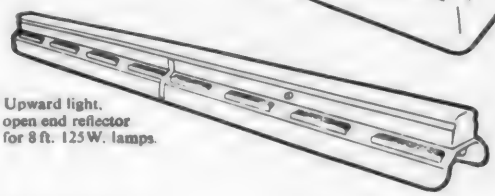
'Taskmaster'—an outstanding range of contemporary fittings finished in the famous Benjamin 'CRYSTEEL' vitreous enamel. New manufacturing methods bring these improved fittings with **one-piece reflector and one-piece channel** into the competitive price field.

Closed end reflector for 5 ft. 80W. lamps.



Upward light, open end reflector for 8 ft. 125W. lamps.

Open end reflector for 5 ft. 80W. lamps.

Acrylic plastic closed top, closed end reflector for 5 ft. 80W. lamps.

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"Mechanised Muscle" embraces the finest range of handling equipment in the world. Reach Trucks, Fork Trucks, Pallet and Stillage Trucks, Tractors and Trailers of all capacities and purposes. ***Write for full details to: Dept 12***

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Sparkler filters, operating in an edible oil plant. Illustration published by courtesy of Loders & Nucoline Ltd.

1322

The fine light by which these men are working is provided entirely by Corrugated 'Perspex'. It has been installed in the Egg Packing Station of the Cheshire Farmers' Association.

Corrugated 'Perspex' sheds light on egg packing

BY USING CORRUGATED 'PERSPEX', the Egg Packing Station you see above has made the fullest use of natural daylight. Daylight which saves money and saves eyestrain. Daylight which means better working conditions and better work.

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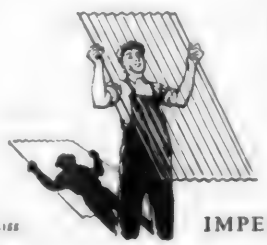

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'Perspex' is the registered trade mark for the acrylic sheet made by I.C.I.

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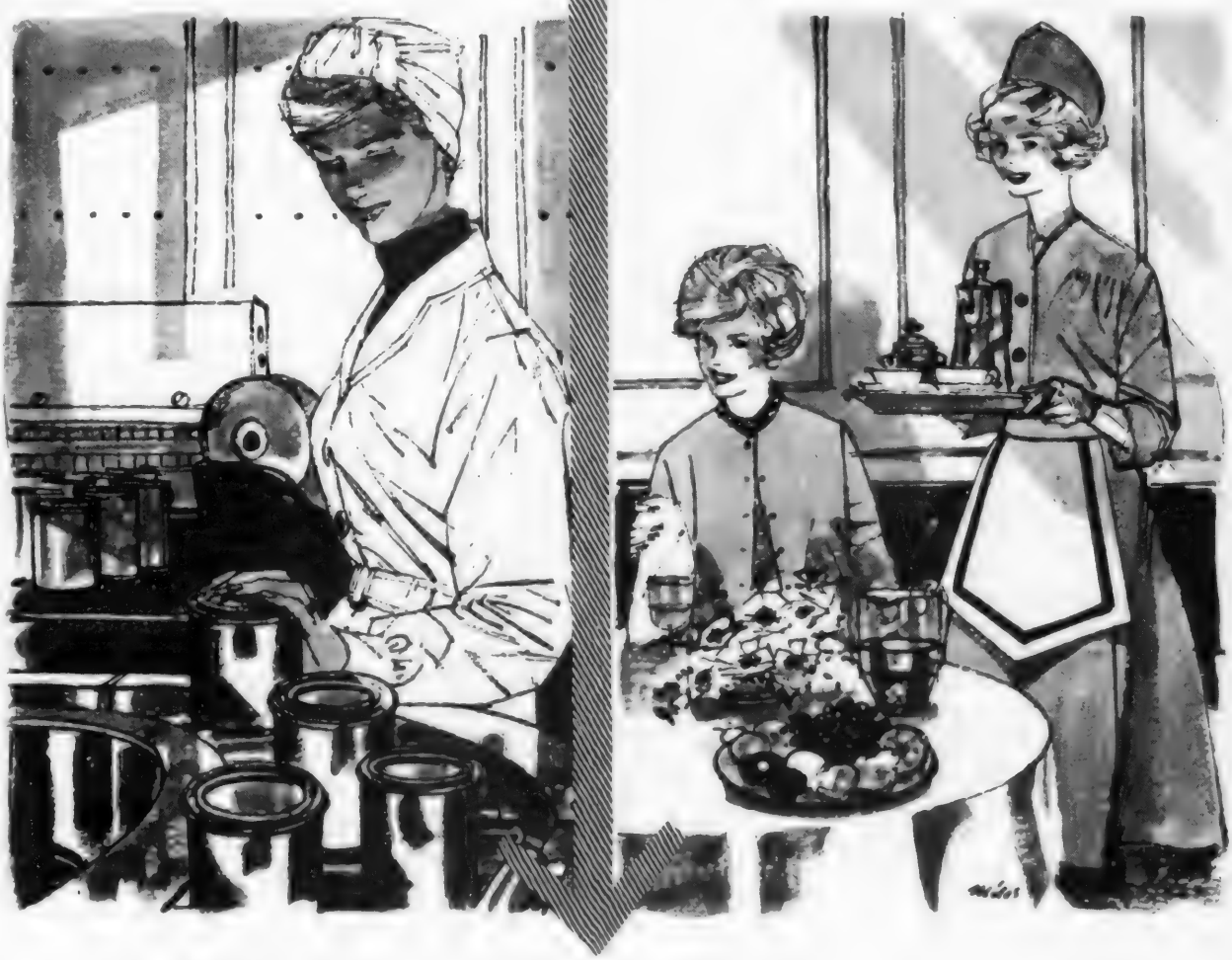

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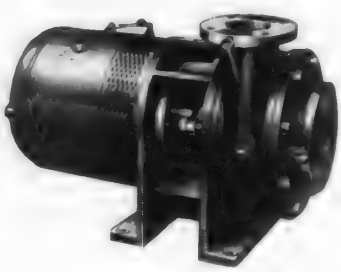

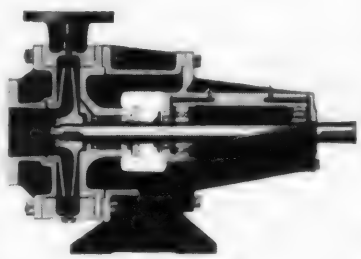

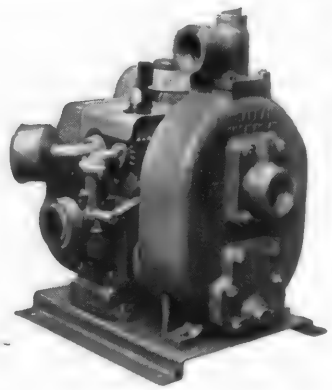

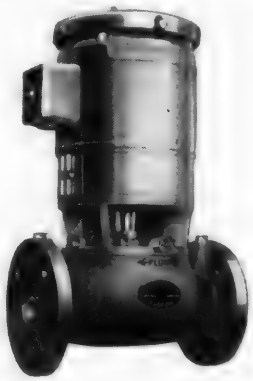

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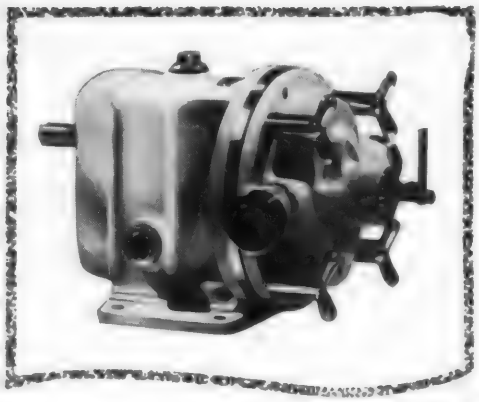
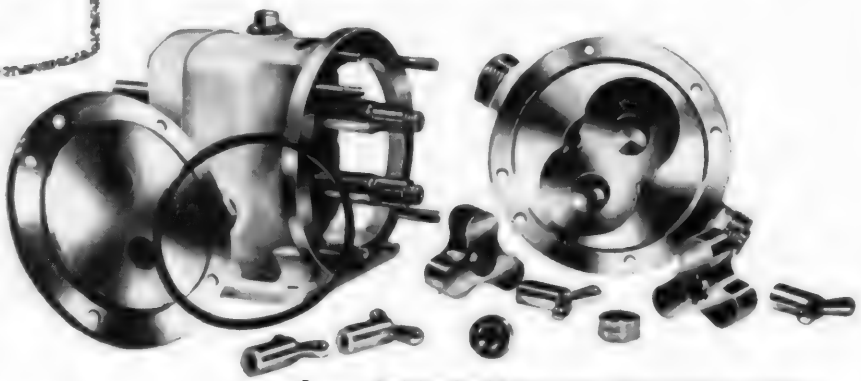


This STAINLESS STEEL *EASY CLEAN* ROTARY PUMP was designed by you...

FOR TROUBLE-FREE PERFORMANCE



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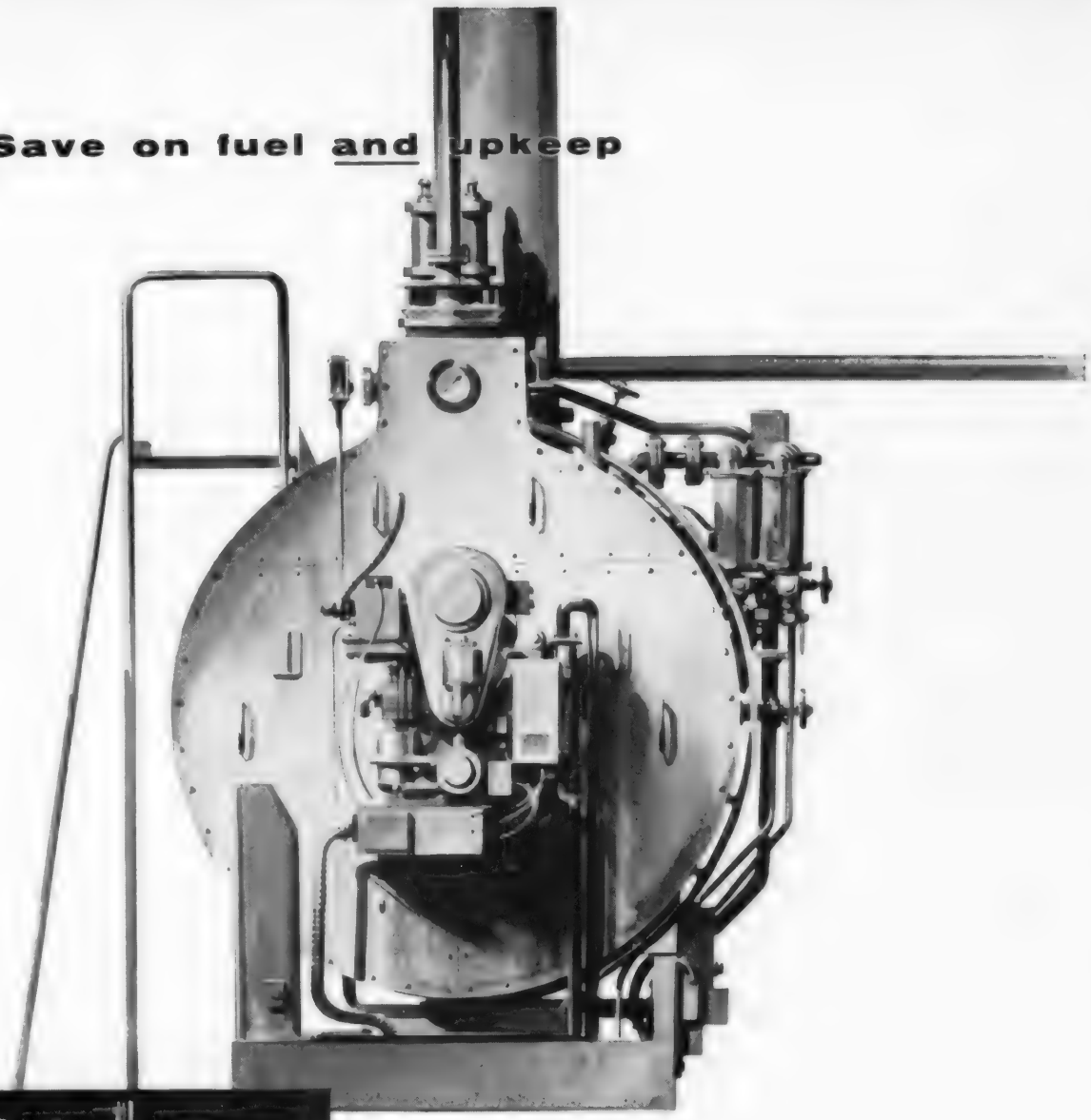

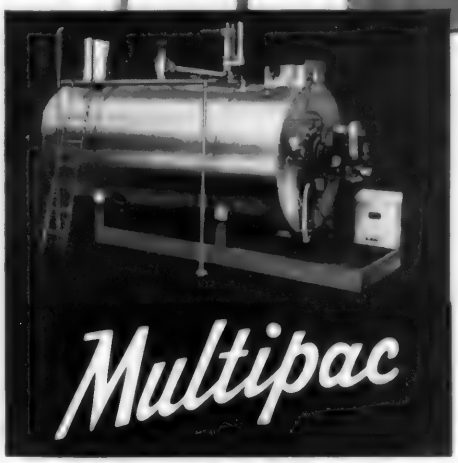

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Ask for descriptive literature. Or better, telephone or write to say you are coming to see a *Multipac* at work. They're wonderful boilers.

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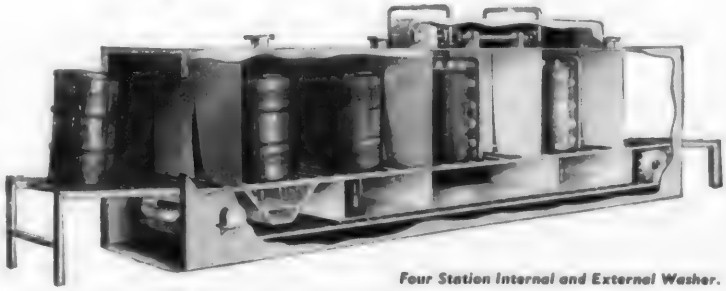

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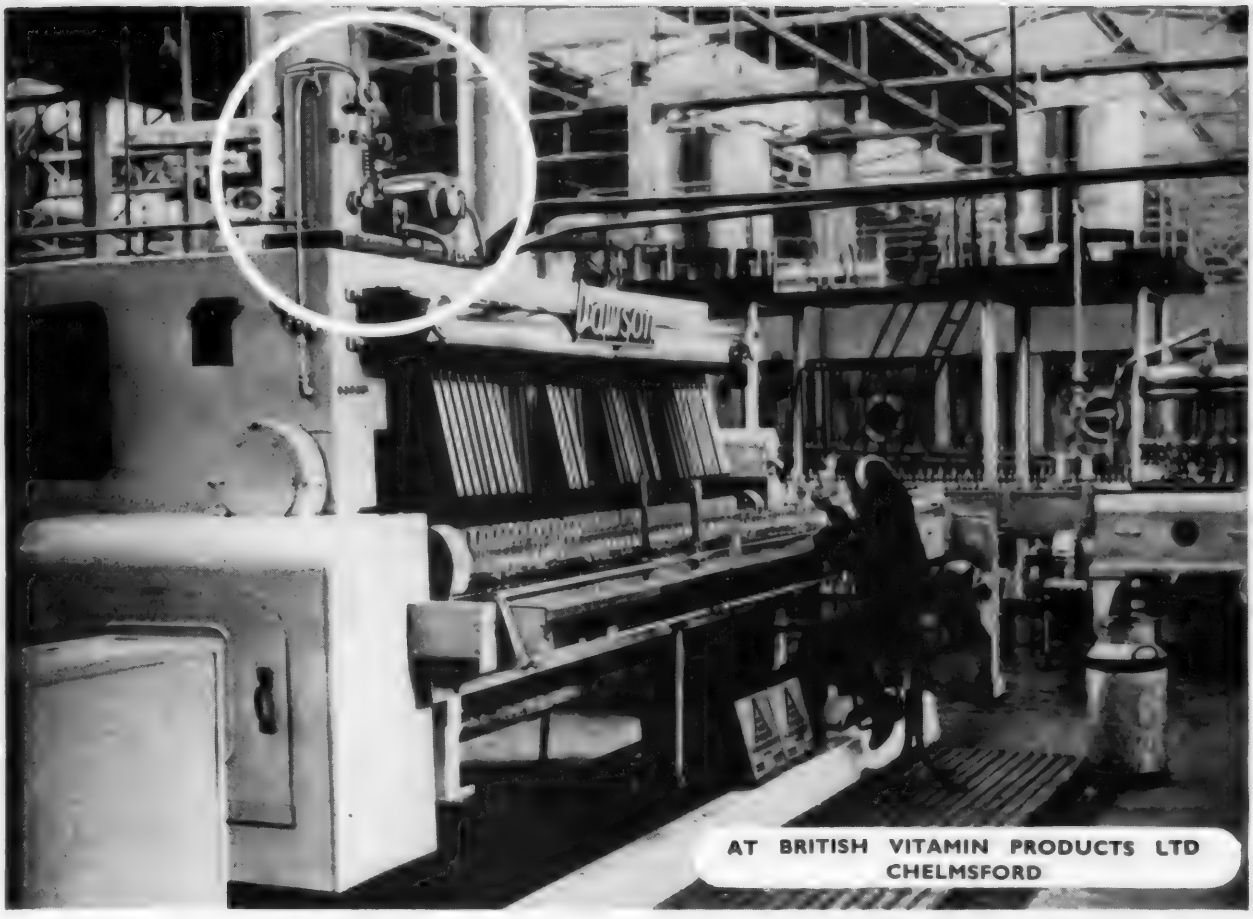
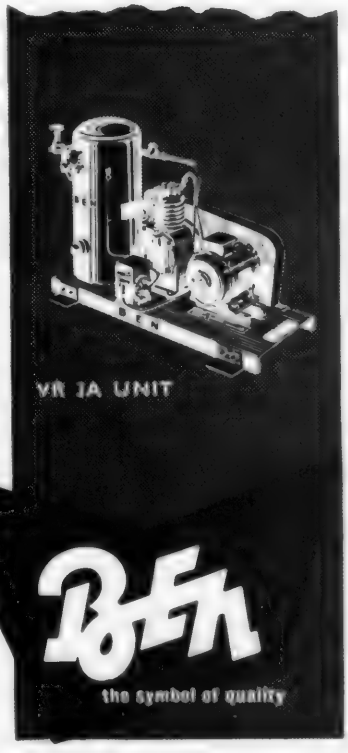


Serving Industry



Many famous names in the British Food Manufacturing Industry select B.E.N. Air Compressors and pneumatic equipment to serve them in the manufacture of their products . . . and the reason? . . . their reputation for reliability and sound performance backed by an efficient after-sales service.

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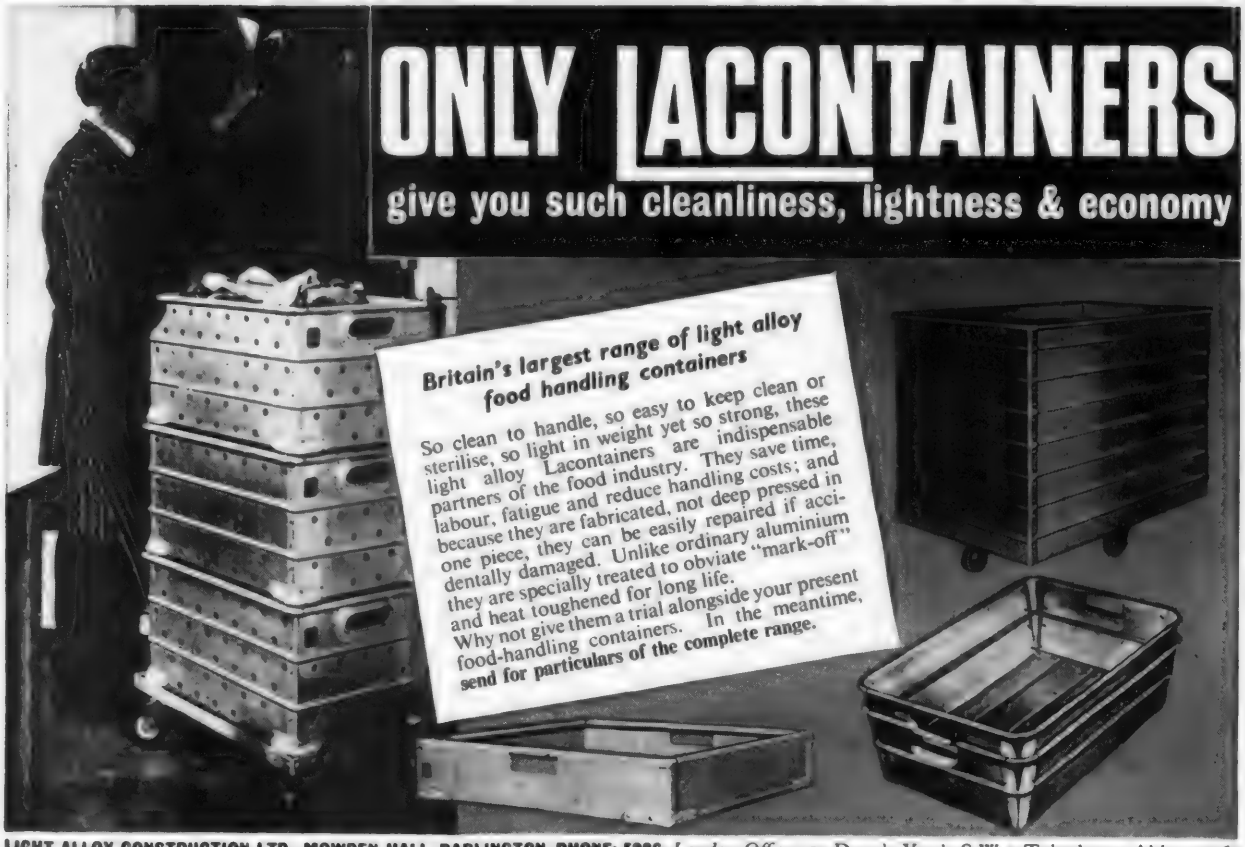
give you such cleanliness, lightness & economy



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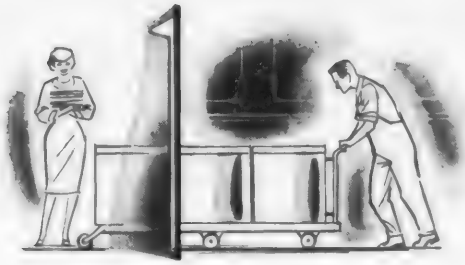

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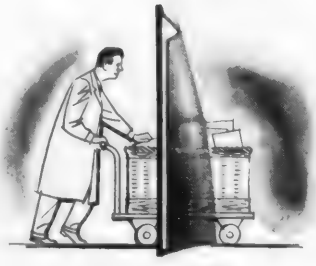

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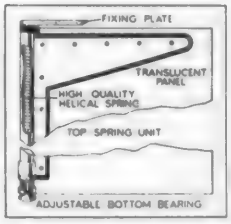

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FOOD MANUFACTURE

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FOOD MANUFACTURE

Vol. XXXIV, No. 4 **April 1, 1959**

The soft drinks rumpus

SUCH a stir has been created by the Food Standards Committee's report on soft drinks that a calm, detached assessment free from commercial partisanship is necessary to get the matter in correct perspective. In one swoop the report strikes quite a number of sensitive spots, which is largely the reason for all the pother; it makes a number of suggestions, to which interested parties have made replies (not all of them, it seems, carefully considered), each of which must be examined and judged on its merits before evaluating the report as a whole.

The Committee's assertion that confusion exists about the composition of soft drinks is undoubtedly true. Cases where mothers have placed the same value on orange drinks as on concentrated orange juice have occurred; certain sections of the industry have only themselves to blame if, through the use of pseudo-medical jargon and the emphasis of certain properties of carbohydrates, they have persuaded some of the public to attach to soft drinks therapeutic qualities which they do not possess. The report's recommendation that the use of the term "glucose" should not be permitted *in connection with the labelling and advertising* of soft drinks has been severely criticised by the glucose industry, whose spokesman swiftly condemned as "misleading to the public" the report's proposal. We feel the phrase in (our) italics has significance, for it robs the industry's retort of much of its force. No one questions that "invalids and others need large quantities of energy-giving carbohydrates" and may need to take this in the form of glucose, but is it seriously suggested that for these patients certain proprietary soft drinks are prescribed? Let us be honest; which is more misleading, the committee's report or the claims made for some drinks which contain a small quantity of glucose?

In the matter of the proposed prohibition of saccharin the report is on much more shaky ground, and here the statement by the saccharin interests that the report creates a totally false impression as to the function of this harmless synthetic sweetening agent certainly has substance. Rarely is saccharin used in soft drinks (other than the diabetic kind) alone without sugar to provide all the sweetness. Although sometimes used as a cheap substitute for some of the sugar, it has a flavour of its own and is valuable for adding its own peculiar form of sweetness without increasing the syrup density. As there is only one manufacturer of saccharin in the country, and the quantity imported is negligible, the saccharin trade would be seriously inconvenienced if the proposal were implemented, for the soft drinks industry uses 60% of its output. If the committee's statement that soft drinks have little food value is accepted, its proposal to prohibit saccharin is surely illogical.

The general impression is that although some of the proposals are sound, in others the committee has gone beyond the bounds of discretion. Creeping government interference is already rampant enough in daily life without unnecessary additions; one suspects that in the new proposals there is more than a hint of control for control's sake. This tendency must be strongly resisted. The public has a right to be protected from exaggerated advertising claims and from products which are not what they are made out to be; this is what government advisory committees are for. Nonetheless, we hope that the ministers concerned will consider the report very carefully before implementing such of its recommendations as they think fit.

More about British bacon

IN our February issue we commented on the first annual report of the Pig Industry Development Authority, who have now issued a code of practice for the curing of bacon by the Wiltshire tank-curing method. As stated elsewhere, nearly three-quarters of bacon produced in this country is now cured by the Wiltshire method, although other regional methods are still in vogue locally. Salting meat to preserve it has been practised since the dawn of history, and in olden times the practice was a necessity to the rural population of this country, who rarely tasted fresh beef and who lived largely on fresh pork in the summer and salt pork in the winter. Probably this accounted for the establishment of bacon curing, although the crude method originally practised must have produced a very salty bacon unacceptable to modern palates. Bacon curing, there-

fore, is no more than a refinement of the ancient process of salting, and until the middle of the nineteenth century, when scientific principles began to be applied, it was a local affair and unorganised.

Until the introduction of refrigeration and air conditioning, bacon curing was a seasonal affair which for best results was done between October and March, but in well-equipped establishments, of course, this constraint no longer applies. Perhaps this partly accounts for the dominance of the Wiltshire tank method, which lends itself to precise control.

Techniques of smoking, too, have changed over the years. At one time, hams were hung in the chimney over a fire of oakwood, usually for about 48 hr., but often for several weeks. Nowadays, the latest techniques involve the controlled burning of sawdust in automatic burners which provide a uniform and constant smoke supply suitable for the production of a uniform product. The delicate palates of today prefer a less highly flavoured bacon than our grandfathers liked, and the smoking process is complete in 12 hr. or less.

In the short time of its existence the Pig Industry Development Authority is already exerting considerable influence. The large manufacturers are co-operating wholeheartedly, which is all to the good, for much needs to be done to improve the quality of British bacon and to recover the ground lost to overseas competitors.

A new use for sawdust

WORK carried out at the University of Florida on cultivating mushrooms in sawdust shows promising results. The commercial mushroom, *Agaricus campestris*, was cultivated on fortified, composted gum wood sawdust, and on a weight basis yields were considerably higher than yields from horse manure compost. Growers, however, will be much more interested in the yield per bed, for sawdust is much less dense than manure, and on this basis the yields were low. There are indications, however, that deeper beds will permit higher yields per area. With 8 in. deep beds, 2½ lb. of mushrooms per sq. ft. were obtained. Production of mushrooms from the sawdust was rapid, making possible frequent turnover and multiple use of bed space during the year.

Experiments were carried out with different types of sawdust supplemented with oatmeal, corncob, and soybean meal, and with balsa wood sawdust, both plain and fortified with mineral salts and meals. Gum wood and balsa gave very good results; hardwoods generally were preferable to softwoods. Composted sawdust gave considerably better results than uncomposted, explained probably by the partial degradation of the wood fibres which occurs during composting and which makes the sawdust more easily digestible by the mushrooms.

Mushrooms are a source of essential amino acids and of the B vitamins, and can be "factory produced" all the year round from waste products originating from non-depleting sources. The realisation of their food value is growing, but full exploitation awaits more efficient production and lower costs.

Mushrooming broiler huts

THE case of Mr. Eggett's broiler houses is causing quite a stir. Mr. Eggett, it will be remembered, successfully defended a test action brought against him by Huntingdonshire County Council, who tried to prove that four 500 ft. long buildings for the rearing of 120,000 chickens were factories within the meaning of the Act, and therefore subject to planning restrictions. Now the parish council of Lee, Bucks., are up in arms because they say that broiler houses are springing up like mushrooms all over the place, and as they are classed as agricultural buildings and not factories, they do not require planning permission. "The council asks for the demolition of the buildings at present erected and in process of erection. We believe that this is a clear case of people openly setting out to flout the spirit of the Act." So runs a petition presented to Bucks. County Council. "We are definitely not anti-broiler," said the chairman. Another member described the broiler houses as "a financial ramp to get money out of suckers."

Now what is the bewildered city dweller to make of all this fuss and bad language? Is the rearing of broilers a financial racket or is it not? We would think the broiler buyer would have the answer to this in his own hands by refraining from paying too much for his broilers. What lies at the root of Lee Parish Council's objection—the fear that a spreading rash of unplanned broiler houses will spoil the look of their village and its surrounding countryside, or that they are prevented from exercising the small amount of power they might otherwise have? Let us hasten to add that we are not taking sides in this matter; the affairs of Lee are its own concern. But the initiative and enterprise of small businesses are the backbone of this country's economy. There are many people who sit on committees and who try and regulate the lives of others. Our lives are ruled and fettered too much as it is by control and regulation. Everywhere we are subject to the reign of petty bureaucrats whose number seems to be increasing all the time. We can hardly imagine that a few broiler houses matter very much when the countryside is despoiled (albeit for good and necessary ends) by motorways, atomic power stations, and electric pylons.

Insect fodder

"ANNUAL labour effort of at least 1 million men is needed to 'feed' the nation's insects" reports Louisiana State University. The United Nations Organisation estimates the annual loss of the world's grain attributable to insects alone to be about 13 million tons, equal to the total annual consumption in the U.K. There may have existed since life began on Earth some 500 million species of insect, and of the two million or so insect species which survive in the world today, only a few manage to achieve insect status because the controlling factors in their environment have favoured their multiplication. There are two ways of controlling pests, therefore; either by killing them outright or by altering their living conditions. The first is much the easier, and the standard answer to the problem is to kill off the offending pests with one or other of the many chemicals now available. No one wishes to discourage the use of pesticides, but it is clear that vast quantities are being used with little consideration of the long-term effects. The use of such pesticides often raises problems as complex as those it tries to solve. The possible repercussions of pesticide residues on the health of humans and animals has caused concern, and "cleaning up" techniques have had to be developed for such materials as aldrin, dieldrin, and endrin in crops, and organo-phosphorus insecticides in vegetables. This places a heavy burden on the analytical chemist who has to check that such techniques are satisfactorily carried out. Insecticide tolerance and the destruction of the natural predators of the insects by the insecticides are other major problems of entomologists.

On the credit side the results of the use of pesticides are very great. We learn from our associate journal *World Crops* that in the U.S.A. as much cotton is produced today from 15 million acres as was produced from 40 million in 1920, an increase due largely to the use of insecticides. Such figures are paralleled in the field of crops for food. To the food manufacturer, a greater problem is the infestation of stored materials and products, for which a variety of fumigants are used. But, as is pointed out in an article in this issue, the most effective method of infestation control is cleanliness. Good housekeeping is an attitude of mind; such precautions as the complete emptying and cleaning of receptacles before refilling and the use of stocks in strict rotation, simple and common-sensible as they are, are practices acquired as the result of deliberate managerial policy and vigilance; only too often when vigilance slackens, slipshod habits arise and then the trouble starts. It is much easier to prevent infestation occurring than to eradicate it when it has got a hold.

A slightly different approach to the question of insect control is the use of a synthetic dust which dehydrates the insects, so killing them. Since no biochemical reaction is involved, it does not seem that the insects can build up an immunity. The dusts consist of silica gel or ærogel with particle size of about 0·2 microns diameter; they function by absorbing the waxy or oily layer on the insect's surface which protects the insect from desiccation, and it is said that only a small amount is needed to kill the insect in a short time. The dusts are said to be non-toxic and harmless to man and beast.

Feeding the Russians

IT is very difficult to gain information from the U.S.S.R. as to what has been done, although the party propaganda machine is not bashful about what will be done. As an article in this issue shows, some of the official figures need to be taken with a grain of salt; Russian meat consumption, for example, cannot be as high as the Soviet authorities would like the world to believe. One of the leading lights in the Russian food industry has been Mr. Mikoyan, who was responsible, among other things, for the establishment of canning factories. On his previous visit to the U.S.A. in 1936 he absorbed many ideas which he put into practice on his return to Russia. He also helped to start Russia's ice cream industry and opened Moscow's first large ice cream factory in 1937. The Russians are very fond of ice cream and probably consume more per head than anyone else in the world. Although the winter in Russia is colder than most, we are informed that sales of ice cream hardly drop from the summer level.

The Soviet economy is striving desperately to pull itself up by its bootlaces to a parity with the U.S.A., but although it may have done so where sputniks are concerned, with food it is another matter. In fact, it is difficult to see how the tremendous effort, for military and prestige purposes, which the Russians have devoted to nuclear weapons and rocketry, does not adversely affect more domestic matters. Much of Russia is still very primitive; many regions still lack a daily supply of fresh milk, hence the great efforts being made in the field of dairying. Sour-milk products form a larger part in the Russian diet than they do here. A product known as *kefir* is widely known. This originated long ago in the mountain districts of the Caucasus and was obtained from a material called the Prophet's Millet (presumably the inhabitants were Muslims). The recipe was kept secret, no doubt to avoid defilement by unbelievers, but now the new unbelievers have spread the secret far and wide, and it is known that the Prophet's Millet was a culture of bacteria and fungi

causing milk to ferment and produce a sour beverage. Sour-milk products have been put into large-scale production in many parts of the country, and form the basis of a number of regional dishes, such as *matsoni* in Georgia and *koumiss* in Bashkiria. "Drink sour milk and live long" runs an Indian proverb, which the Russians have borrowed; they ascribe the longevity of the inhabitants of Caucasus and Transcaucasia, which have a larger proportion of people over a hundred years old than anywhere else in Russia, to their habit of consuming sour milk.

Spotlight on sardines

THROUGHOUT some 100 countries and territories of the world the sardine forms part of the national diet and in many cases much of the national income. Fishing fortunes fluctuate from year to year with the varying catch, and in a bad season belts have to be tightened and the hungry ones comforted with the hope that next year may turn out better. It is estimated that the sardine catch is worth £18 million a year and that this fish, the genus Sardina and its related genera Sardinops and Sardinella, represent about a fourth of the world's total commercial catch of fish, crustaceans, molluscs, etc., and it comes as no surprise to learn that there is to be a meeting on this subject at the Food and Agriculture Organisation's headquarters in Rome from September 14 to 21 of this year.

The secretary of the meeting, Mr. Horacio Josa, Jr., has pointed out that fishery biologists have been studying the problems for many years but this will be the first time that they have been able to get together and exchange ideas, compare the results of their work and discuss the further research needed on this problem.

Governments concerned have been invited to send representatives and interested private research institutions are also being welcomed.

Since sardines play such a large part in the nutrition of peoples throughout the world it seems more than fitting that the subject should be reviewed particularly in the light of the recent talks which have been considering the conservation of fish stocks in the north-east Atlantic.

Allied to considerations of the fluctuations in the stocks of sardines, there is the question of making proper use of the catch. On page 148 of this issue appears the first part of an article which describes a programme of experiments carried out by the Laboratorie de la Federation des Industries de la Conserve de Maroc. This organisation has investigated various methods of cooking sardines on behalf of the International Permanent Committee on Canned Foods.

"What has happened to your jam?"

WE were recently talking to a nutrition expert from overseas who last visited this country before the war. "What has happened to your jam?" he asked. Britons may well ask the same question. The visitor remarked that most of our jam, and marmalade, now has a syrupy bland taste lacking the subtle fruit flavours he remembered it used to have. How true this is. We are especially concerned about a certain well-known brand of marmalade which used to be our favourite; although still with the original label, it has markedly deteriorated in recent years. Have the oranges deteriorated? If so, this cannot be the whole story, for we recently tasted some exemplary home-made marmalade superior to anything on the market. What about strawberry jam, which is now (when obtainable) a sickly pulp whose connection with strawberry is in little more than its name? It is said that the steady deterioration in strawberry quality is causing much concern, but what is particular to one fruit surely cannot apply to all.

Perhaps the manufacturers, in catering for a public taste which has become sweeter in the tooth, are drowning the delicate fruit flavours with sugar. If so, it is time public taste became better educated. The falling jam sales may indicate that public taste is more critical than the manufacturers suppose, but public taste in food matters generally is poor. If the general nutritional standard has risen, we are sure that the general appreciation of the finer points of good eating has fallen. War-time shortages, mass-produced meals in canteens and restaurants, the congestion of city life which makes eating in mediocre snack bars a necessity for many, are some of the factors concerned in this complex problem. People are too ready to be palmed off with the second best. There is a danger that in concentrating too much on the nutritional aspect of food, there is being fostered an attitude of mind whch regards food as bearing the same relation to a human being as petrol to a motor. Certainly the nutritional aspect is of vital importance, but it is not the only aspect. Psychology and biology cannot be divorced, and in this curious age when psychology is given more study than it used to be, we are in danger of not seeing the wood for the trees. The psychological techniques used in television advertising, for example, are so developed that we wonder whether they sometimes defeat their own purpose, destroying the sense of discrimination which the advertiser hopes to manipulate to his own advantage. At any rate, it is about time something was done about our jam, and if the research departments can discover why it has deteriorated, the information will be of more value to the manufacturer than the results of intensive advertising campaigns.

Wiltshire Bacon by Harris of Calne

At Calne, Wiltshire, Harris have been curing Wiltshire bacon for nearly 200 years. In an exclusive visit last month, FOOD MANUFACTURE was shown how modern techniques streamline traditional methods.

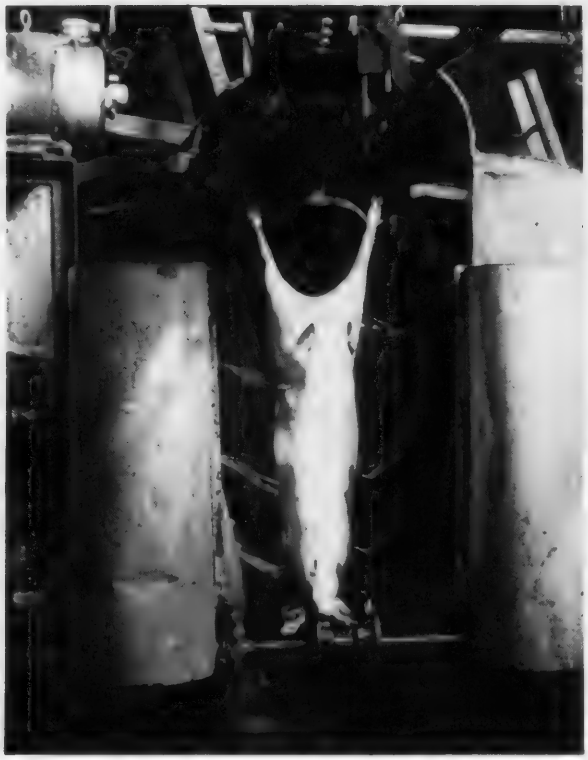
THE firm, which later became C. and T. Harris (Calne), Ltd., began in 1770 when John Harris set up a butcher's shop, on the site of which now stands the largest Harris factory. At that time, Irish pigs, unloaded at Avonmouth, used to be driven in large numbers along the Bath Road to London and other principal cities; Calne was a resting stage for these pigs, and from these herds John Harris bought supplies for his shop and curing business. Thus it was that Calne came to be the original town where Wiltshire bacon was produced. John Harris's two sons, John and Henry, each had a shop; in course of time these passed to John's sons, Charles and Thomas, and to Henry's nephew George. George took Charles into partnership, and when he died Charles became sole proprietor. Thus there were two businesses, run by the two brothers Charles and Thomas. In 1888 these were amalgamated and the firm later took the name by which it is known today.

When the Irish famine of 1847 stopped the supplies of Irish pigs, George Harris went to America to look for alternative supplies, and although this project eventually failed, George brought back with him an idea for using refrigeration by ice in bacon curing, a process which revolutionised the curing industry and for which Harris obtained a patent in 1864. The process was superseded in 1887 when the first mechanical refrigeration plant was installed. The bacon curing business continued to develop, and during the latter half of the nineteenth century Harris successfully expanded their range of products to include the manufacture of sausages and brawn. Pork pies have been made by Harris for many years: in the middle of the nineteenth century Henry Harris was still described as a "baker and bacon factor." Since the beginning of this century, Harris have developed very considerably this "small goods" side of their business to include such well-known products as veal, ham and egg pies, Calne polonies, and bath chaps, and during the first world war the firm began producing canned sausages, canned meat, and vegetables for the troops. In 1931 an expansion programme was started which more than doubled the output of pies, sausages, and other subsidiary products. At the present time the firm have 17 factories and depots throughout the south of England of which the Calne factory is the largest.

Brining of pig sides before curing. Brine is injected into the flesh under pressure, and the operator through long experience knows exactly how much to inject for perfect curing.

Slaughtering

The start of the bacon process is the highly efficient slaughterhouse. The animals are admitted to the stunning pen and are deftly stunned with a pair of electric



(Left): **After dehairing, the carcasses are singed in this oil-fired singer to firm up the flesh, add flavour to the bacon, and to remove any hairs which have escaped the dehairer.** *(Right)*: **The mechanical scraping and washing machine which scrapes the singed flesh after singeing.**

tongs which an operator clamps across the neck of each pig behind the ears. We were interested to learn at this point that Harris are already negotiating for the latest apparatus with which the pig is anæsthetised by carbon dioxide gas, a more efficient and humane method which has recently been legalised. As the pig falls to the ground an assistant attaches a chain shackle to one of its hind legs and the unconscious animal is hoisted to a moving conveyor which takes it to the sticking bay alongside where it is stuck. The blood is collected in pans and used for making black puddings, or dried for use in fertiliser.

The next operation is scalding. The carcass is lowered into a large tank of hot water and travels slowly along submerged in the water for a time sufficient to clean it and loosen the hairs. It next passes through a dehairing machine, where rotating scrapers, over which it passes, remove the bristles. The hair has several uses, among which is the stuffing for car upholstery. After dehairing,

Pigs are stunned electrically before slaughter with an 80 volt shock administered with this pair of tongs.

the carcass is once again attached to a moving conveyor, this time by both hind legs, on which it travels through all the succeeding operations through to the chilling room. It passes through an oil-fired burner, where it stays for a few seconds to firm up the fat and rind, give a distinctive flavour to the resultant bacon and remove the few remaining bristles. From there it goes to an automatic scraping and washing machine which thoroughly cleans the carcass, leaving it clean and smooth. Final scraping of the less accessible parts is done by hand.

Now comes the first veterinary inspection; the neck is cut and the lymph glands examined for tuberculosis; if found, a coloured disc is attached to the carcass and travels with it right through to the final veterinary check point. There is a system of coloured discs to denote the various types of diseases and defects, including injury, which may be found at any of the veterinary check points throughout the processing line; these discs are attached when appropriate and when the carcasses arrive at the final check point, the operators know that any marked with coloured discs must be kept on one side for inspection and must not be disposed of until specific instructions have been given by the fully qualified veterinary inspector.

(Left): **The weighing and marking of carcasses is watched by officials of the Ministry of Agriculture.** *(Right)*: **A section of the chilling room where carcasses remain for 24 hr. before being cured.**

Sorting of parts

After inspection of the lymph glands, the carcass is cut down the front and back, then conveyed along a line of workers who remove the inwards, sort them into the different lots, wash them, and put them in vats of salt. Any parts suspected of disease are put into separate bins to await veterinary inspection.

By this stage certain of the offal has been removed: gut, heart, liver, and lungs. The next operation is the removal of the backbone which is, however, retained for eventual weighing with the carcass. The carcass, still hanging by the hind legs, is now in two halves joined by the head. The two halves are stamped with a number which is recorded on a card together with the number tattooed on the animal by the farmer. The weighing of the carcass, with its backbone, which comes next, is watched by representatives of the Ministry of Agriculture. The weight is recorded both on the card and on the carcass. Also measured are the length of the carcass and the fat thickness; the latter is measured at two points with a gauge, and determines the grading of the carcass—A, B, or C according to the thickness of the fat.

Final inspection

Some of the remaining offal, such as kidneys and flare fat, is removed and then comes the final veterinary inspection. Carcasses carrying no coloured discs pass straight to the chill room, but suspect carcasses are kept on one side and are examined by the veterinary inspector, who makes a detailed examination and issues appropriate disposal instructions.

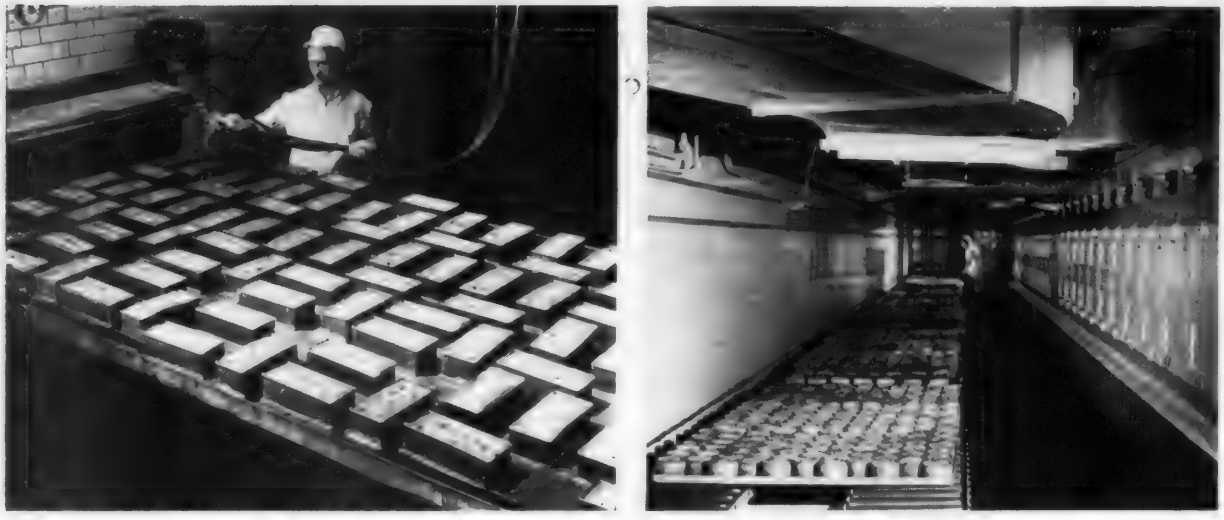
Before curing, all the body heat must be removed and the carcass next passes to the chill room where it remains for 24 hr. During this time, the carcasses can be examined from the point of view of weight, size, proportions of fat to lean, etc., so that a report may be submitted for the guidance of the relevant pig producers. The head is now removed and the carcass divided into two separate sides.

BACON

Trimming

After chilling, the sides are trimmed to remove parts unsuitable for curing. The tenderloin or lumbar muscle, the neck, breastbone, front foot, and any blood clots in the throat are also removed—the hind feet are removed immediately prior to the start of the curing process—and the backbone trimmed with a small elec-

One of the curing tanks being loaded with pigs' sides; after receiving its complement of about 700 sides, the sides are clamped down, the tank is filled with special brine and left for 5 days.



(*Left*): **Spraying 7 lb. pork pies with egg glaze.** (*Right*): **¼ lb. pies after emerging from the travelling oven.**

tric saw. The shoulder blade is removed in two operations; in the first, an operator makes several cuts round the bone, a skilful procedure because if not correctly done some of the meat will be pulled away during the next stage, in which the protruding end of the bone is grasped by a claw clamp and levered out. On completion the Wiltshire side, as it now is, is ready for curing.

The heads after removal are washed in a rotating drum washer.

Curing

The term "curing" describes the treatment with brine or salt, and is distinct from the subsequent smoking. At Harris's, two methods of curing are carried out, "tank" curing and "dry" curing; the former being much the more common nowadays. The tank method takes two weeks and involves immersing the sides in brine for 5 days followed by a 9-day maturing period; in the dry method, which takes three weeks, the sides are covered with dry salt for several days and then left in a stack to cure and mature.

For tank curing the sides are first injected with fresh brine by means of a needle syringe attached to a pump. This operation is not haphazard; the points of injection and the amount injected have been learnt through long experience. Too little brine will result in insufficient curing and too much will cause unpalatability.

After injection the sides are stacked in tiled tanks which hold about 700 sides apiece, and held down with wooden clamps which prevent them floating to the top in the high density brine.

This brine has been in use for 25 years and is kept in perfect condition by rigid laboratory control; this, say Harris's, is one of the secrets of well-cured bacon. After continual use, the brine itself matures and acquires beneficial flavours which it imparts to the bacon.

After the 5-day immersion period, the sides are stacked on boards and left to mature for 9 days.

Smoking

The bacon thus produced is now known as "green" bacon. In many parts of the country smoked bacon is preferred, as it has its own particular flavour; the sides are hung in stoves, and smoke is circulated around them, imparting the flavour which is so much sought after.

This smoke is generated from specially selected hardwood sawdust, which is burnt in a combustion chamber outside the smoke stove. The smoke, of controlled humidity and concentration, is then fed into the stove, thus ensuring uniformity of the final product.

OTHER PRODUCTS

A considerable amount of lard is also produced, this being derived from the kidney fats, and surplus fat trimmings.

Pork

Pork is produced both from specially purchased pigs which are lighter in weight than baconers and from carcasses that are more suitable for pork than for bacon. The carcasses are cut with a bandsaw into four sections known as back, shoulder, leg, and belly. The various joints are broken down by hand; the rind is removed from the backs, or loins or griskins as they are now called and excess fat cut off.

Meat pies

The pie-making department is a very considerable part of the factory; a popular product is the ¼ lb. pork pie which is made in large quantities by continuous automatic machinery. Other products are 1, 2, 4, and 7 lb. pork pies and veal, ham and egg pies.

Many different kinds of pastry are made in the pastry department for the various kinds of pie; dough is made in lots of about 500 lb. a time in an automatic machine. The dough is portioned by a machine which measures out exactly the right amount for each pie; a moulding machine moulds the pie bodies which then pass to

(Left): **Part of the production line for ¼ lb. pork pies. The lids are being cut from sheets of dough and placed on the pies, which then travel to the stamping machine seen top right.** *(Right)*: **Packing cooked meats. Handlers wear face masks to prevent contamination.**

a filling machine which fills the pie with seasoned chopped meat filling which has meanwhile been previously prepared in the pie mixture section.

A machine cuts out the pie "lids" from sheets of dough, and these are put into position by operatives as the pies pass in front of them along a moving conveyor to the stamping machine, which crimps the edges of the pies and prepares them for baking.

The small pies then enter a travelling oven through which they pass in about 35 min. On emerging from the other end, an operator sprays them with egg glaze. Later they are filled with hot liquid jelly by operators who deftly pierce each pie with an injection needle. The pies are then cooled in a cabinet into which is blown filtered cooling air. After laboratory checking, the pies pass to automatic wrapping machines for packing in transparent wrappers; before packing they pass through a detector which automatically stops the packing machine if metal is detected. It is, however, very rare for foreign matter to find its way into a pie.

The kitchen

This occupies one complete floor of the factory and in it are carried out all cooking and roasting operations, such as the cooking of gammon, preparation of bath chaps, roasting of legs of pork, the manufacture of black puddings, brawn, faggots, etc.

Bath chaps are made from the boned half jaw. Pigs heads are sawn longitudinally into four sections, two eyepieces, and two chaps. Each chap is cured, boned, cooked, and pressed into a triangular mould and then rapidly cooled. After sprinkling with crumbs the chaps are packed in transparent printed bags.

Gammon is first boned, then pressed into metal moulds in which they are cooked. The rind is then removed and excess fat cut away before packing.

On some jobs the operators wear face masks to avoid any possibility of infecting the goods.

In this department also the production of sage and onion stuffing, parsley and thyme stuffing, and dried bread crumbs is carried out.

Sausages

Sausages are a well-known product of the Harris firm. The sausage meat, both pork and beef, is chopped in a machine which mixes 200 lb. of sausage meat in a very short time. The sausage meat is filled into casings by filling machines and are conveyed down the table to operatives who weigh standard amounts; each weighed length is then twisted by deft practised hands into the familiar bundles of sausages, which are wrapped in heat sealed transparent wrappers and packed.

Canning

Most of the cans used in the canning department are made in the firm's can making section, where cans of the common sizes are fabricated from lacquered tinplate bought in sheets. Canning of cooked meat is performed by automatic rotary filling and capping machines; the filling machines can be adapted for the several varieties of products which are packed in this department. All canned products before despatch are kept for 10 days at 100°F. in a special store as a check for sterility; any which show deterioration are rejected.

Experimental department and laboratory

The experimental department is a miniature version of the factory, with small-scale machines to make pilot quantities of experimental products. There is also a laboratory for carrying out investigational work and routine testing. One of the most important jobs here is to examine the canned goods and each batch must be of a certain standard before the goods are despatched.

Sardine canning in Morocco. The sardines are cooked in steam in the cans. The left hand picture shows the cans being fed on to the conveyor to pass under the automatic oil filler. On the right is a general view of the oil fillers and the seamers, one of which is automatic.

Experiments in Cooking Sardines—1

By R. Meesemaecker and Y. Sohier

The authors describe a programme of experiments carried out at the "Laboratoire de la Federation des Industries de la Conserve du Maroc," Casablanca, on behalf of the International Permanent Committee on Canned Foods. Various methods of cooking were investigated; results are given.

IT is much easier to describe the effect of heat on foods than to define the term "cooking" satisfactorily. Apart from the chemical and physico-chemical changes which may occur during the process, cooking affects the organoleptic character, and, depending on the method of cooking, changes the weight, volume, and nutritive value of the food. Space is not sufficient to examine in detail all these changes; more attention will be given to changes in weight and their effect on the composition of cooked food.

Experimental programme

A programme of experiments was drawn up in which the sardines were cooked in various media (water, brine, oil, hot air, and low-pressure steam); variations were made in the temperature and time of cooking, and sometimes in the composition of the cooking medium. As a result a large mass of figures has been accumulated. These have enabled us to postulate several fundamental principles regarding cooking and at the same time to evaluate the method used.

Methods of cooking

The methods are subdivided into four groups, which will be dealt with in turn.

1. Cooking in water and brine.
2. Cooking in oil.
3. Cooking in hot air.
4. Cooking in steam.

I. COOKING IN WATER AND IN BRINE

The few authors who have taken an interest in the cooking of fish have given some account of the method of cooking sardines in brine. According to them, the brine used must be saturated. The sardines, previously arranged on grills must be plunged into the boiling brine at about 108°C. (225°F.). In order to obtain such a high temperature the use of saturated brine is advised.

The time of cooking should be from 5 to 12 min. according to the size of the sardines. After being taken out of the brine-boiler the fish are allowed to drain and dry for 12 hr. They are then packed into cans, covered with oil, and sterilised after seaming.

This method should give the best results with large sardines. Small fish give products which are too salt since it has been shown that the absorption of salt varies inversely with the size of the sardines in use.

This information gathered from the literature did not convince us of the need to use a 25% brine solution at a temperature close to 108°C. We therefore proceeded to experiment with cooking in distilled water and in brine solutions of 15% and 25% sodium chloride for various times (10, 30, and 50 min.). Immersion of the sardines

Table I. Cooking in water and in brine

Losses of weight by cooking and sterilisation

(Results calculated to 100 g. of raw sardines, edible portion)

Cooking time	Brine concentration	Apparent weight losses on cooking	Salt absorbed on cooking	Actual weight losses on cooking	Water in covering oil	Total losses (cooking + sterilisation)
10 min.	water	13·3	0	13·3	11·2	24·5
	15% NaCl	14·3	2·1	16·4	7·9	24·3
	25% NaCl	15·1	3·9	19·0	6·9	25·9
30 min.	water	18·8	0	18·8	6·6	25·4
	15% NaCl	17·4	4·1	21·5	4·8	26·3
	25% NaCl	19·9	8·0	27·9	5·5	33·4
50 min.	water	20·1	0	20·1[1]	6·7	26·8
	15% NaCl	18·9	4·8	23·7[2]	5·2	28·9
	25% NaCl	18·7	8·9	27·6[3]	7·0	34·6

[1] i.e. 17·7 g. water and 2·4 g. various soluble substances.
[2] i.e. 21·3 g. water and 2·4 g. various soluble substances.
[3] i.e. 26·4 g. water and 1·4 g. various soluble substances.

Table II. Cooking in water and brine

Composition of cooked fish

(Results calculated to 100 g. of cooked fish)

Cooking time	Brine concentration	Water	Fat	Salt	Total	Water content of cooked fish: assumed zero salt
10 min.	water	73·0	1·5	0·1	74·6	73·0
	15% NaCl	70·7	0·9	2·6	74·2	72·5
	25% NaCl	68·6	1·3	4·6	74·5	71·9
30 min.	water	72·7	1·4	0·1	74·2	72·7
	15% NaCl	67·8	0·9	5·0	73·7	71·9
	25% NaCl	61·9	1·1	10·0	73·0	69·7
50 min.	water	72·5	1·7	0·1	74·3	72·5
	15% NaCl	67·0	1·1	5·9	74·0	71·2
	25% NaCl	60·8	1·2	11·0	73·0	68·3

Table III. Cooking in water and brine

Composition of fish canned in oil

(Results calculated to 100 g. of drained fish)

Cooking time	Brine concentration	Water	Fat	Salt	Total	Quantity oil absorbed per 100 g. cooked fish
10 min.	water	67·6	6·5	0·1	74·2	5·2
	15% NaCl	65·7	5·9	2·3	73·9	4·1
	25% NaCl	63·8	6·4	3·9	74·1	4·6
30 min.	water	68·2	6·7	0·1	75·0	5·9
	15% NaCl	63·0	6·3	4·7	74·0	5·5
	25% NaCl	55·8	8·2	8·7	72·7	7·7
50 min.	water	67·8	7·0	0·1	74·9	6·3
	15% NaCl	61·9	6·7	5·8	74·4	6·3
	25% NaCl	53·9	9·5	10·8	74·2	8·5

in these boiling cooking liquids causes a very rapid disintegration of the fish and any determination of weight becomes impossible. We considered that there would be no objection to cooking in cans. The headless and eviscerated sardines were packed into cans in the raw state. The filled cans were placed between two metal gauzes and the whole was plunged into the boiling brine for the required time.

The results obtained were remarkable, and it was even possible to prolong the cooking time to 50 min. without appreciable change in the appearance of the fish.

After being taken out of the brine bath, the cans were drained for 15 min., sufficient for an apparent drying of the fish to take place, then filled with oil and sterilised after closing.

In order to follow this method of cooking all we had to do was to mark the successive steps by weighing the empty can, the can plus raw fish, the can taken from the cooking bath, the can after adding oil and closing. For each of the cans processed we thus obtained the weight of raw fish, that of the cooked fish and by difference the loss of weight on cooking, the weight of oil added, and the net weight.

Examination of the canned product gave us, after draining, the weight of canned fish, the weight of oil drained off and, where appropriate, the weight of exudate into the covering oil.

In addition, the percentage composition of the sardine was determined in the raw state, after cooking, and after draining of the covering oil.

A Club 30 can of 125 c.c. capacity holds 125 to 130 g. of prepared sardines which corresponds to approximately 200 g. of whole sardines. An experiment with 5 cans, representing 1 kg. of fresh sardines, is sufficient to limit the errors due to the natural variation in the raw material.

Results obtained

The sardine used, count 38 to the kg., contained raw 75·6% of water and 1% of fat in the edible portion and 0·1% of salt.

We have said above that whatever the method used all our natural foods lose weight during cooking. We may add that this loss of weight increases with the duration of cooking, even in the case of cooking in an aqueous medium (Table I). In fact, for a cook in boiling water this loss increases from 13·3% in 10 min. to 20·1% for a cook of 50 min.

With a brine of 15% NaCl the figures obtained under the same conditions were respectively 14·3% and 18·9%; and in a saturated brine the losses rose to 15·1% and 18·7% of the raw fish.

Actually these figures represent apparent losses and should be corrected for the quantities of salt absorbed by the fish during cooking.

As might be expected, this absorption of salt increases with the cooking time and the concentration of the brine. In a cooking

time of 50 min., for example, the quantity of salt absorbed per 100 g. of raw fish is 4·8 g. in the case of a 15% brine and 8·9% in a saturated brine. These are the quantities of salt which should be added to the apparent losses if it is desired to obtain the actual losses sustained by the sardines during cooking. Corrected in this way the actual losses are found to be: 20·1% during a cooking time of 50 min. in boiling water, 23·7% during a cooking time of 50 min. in 15% brine, and 27·6% during a cooking time of 50 min. in 25% brine.

The dehydrating effect of the brine is quite apparent. We shall return to this subject shortly.

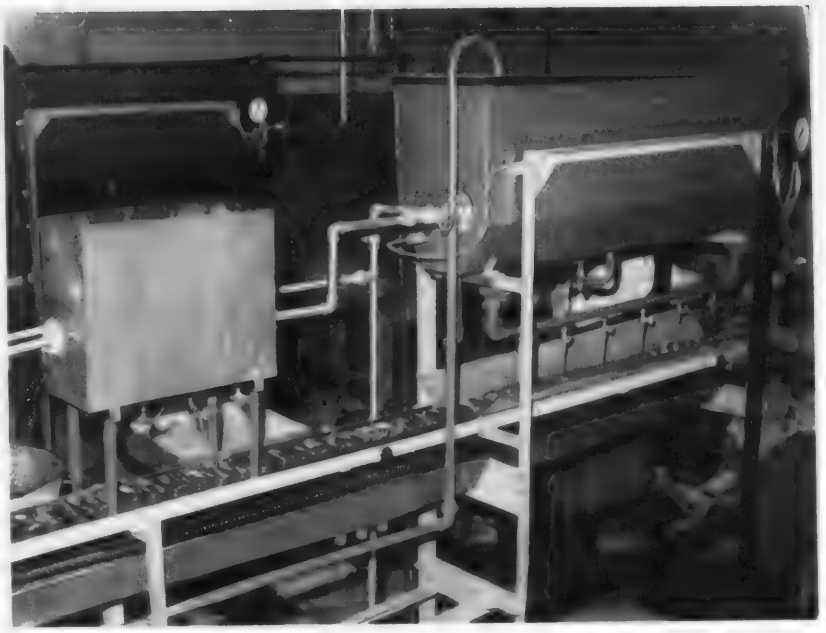
During previous investigations of the manufacture of canned sardines in oil by canning the raw fish and cooking in steam, we showed that the presence of water in the covering oil in this product, after sterilisation in a retort, was due to insufficient cooking of the fish. In other words, the water of composition of the sardine which is not eliminated by a sufficient cook appears in the can after retorting.

Let us therefore see what happens in the case of cooking in water or in a salt solution.

On draining sardines canned in oil after cooking in water or brine we found important quantities of exudate in the separated oil, and these decreased when the cooking time increased from 10 to 30 min. but showed no further change when the cooking time was increased to 50 min. Thus in the case of cooking in water for 10, 30, and 50 min. the quantities of exudate found in the separated oil were respectively 11·2 g., 6·6 g. and 6·7 g. per 100 g. of raw fish.

(With the same sardine we should not have found more than 1 g. of exudate for a cook of 50 min. in steam at 100°C.)

This shows that a cooked sardine has a spongy structure and retains an important quantity of interstitial water that a simple draining is insufficient to remove. It is necessary to dry fish treated in such a manner before adding its covering of oil.



This picture shows a close-up of one of the automatic oil fillers.

Analysis of the cooked fish

The analysis of the cooked fish obtained after varying the cooking time and the salt content of the brine confirms the dehydrating action of the sodium chloride (Table II).

In fact, the water content of the fish cooked for 50 min. is 72·5% for the fish cooked in water and only 60·8% for that cooked in concentrated brine. The salt content varies inversely, from 0·1% to 11%. As to the fat content, this does not differ appreciably from that of the raw sardine, which, we may recall, is 1%.

In the paper referred to above we showed the existence of a constant "water + fat" which represents the sum of these two constituents of the sardine. This constant, to which we gave the approximate value of 72±1 applies not only to drained sardines canned in oil but also to the cooked fish. It was of great interest to determine the value of this constant in the case of fish which had absorbed 10 to 11 g. of salt per 100 g. of fish cooked. It was rather surprising to find that the constant remained valid provided that the salt content was added. Returning to the example, fish cooked for 50 min. showed the following results.

Cooked in:		*Water*	*Fat*	*Salt*	*Total*
water	...	72·5	+ 1·7	+ 0·1	= 74·3
15% NaCl	...	67·0	+ 1·1	+ 5·9	= 74·0
25% NaCl	...	60·8	+ 1·2	+ 11·0	= 73·0

In spite of the considerable differences in water and salt contents, the sum of the three constituents is approximately the same, which means that in cooked fish 1 g. of salt replaces 1 g. of water.

It is probable, however, that this equivalence is not so simple as we have just expressed it. Calculation of the water content of the cooked fish supposedly de-salted supports this. For the same cooking time this water content should be the same whatever the nature of the cooking liquid. In fact, it is 72·5% for the fish cooked in water, 71·2% for the sardines cooked in a 15% brine, and 68·3% when saturated brine is used. These variations in relation to the salt concentration suggest a particular action of the salt on animal tissue.

Examination of the product

The value of a cooking method should not be assessed without also including an examination of the canned product obtained. In this connection the analysis of the drained canned product provides valuable information (Table III).

Table IV. Cooking in oil

Temperatures and times varied

Temperature of cooking	100°C. (212°F.)			130°C. (266°F.)		
Time of cooking	5 min.	10 min.	15 min.	5 min.	10 min.	15 min.
I—Preparation						
Weight of raw fish* per can	121·0	126·5	135·0	132·1	124·7	124·0
Wt. of cooked fish	111·4	109·2	109·0	107·1	99·2	88·1
Wt. of added oil	20·4	22·3	23·9	24·8	31·1	39·0
Mean net weight per can ...	131·8	131·5	132·9	131·9	130·3	127·1
Losses on cooking per 100 g. raw fish	8·0	13·7	19·3	19·0	20·5	30·1
II—Canned Fish						
Weight of drained fish per can	90·8	97·2	98·7	98·9	96·5	87·4
Wt. of drained oil	18·2	19·9	22·4	24·8	32·1	39·7
Wt. of water in oil	22·8	14·4	11·9	8·2	1·7	0
Quantity of oil absorbed (+) or lost (−) during sterilisation, per can	+2·2	+2·4	+1·5	0	−1·0	−0·7

* Calculated according to losses on cooking.

Table V. Cooking in oil

Percentage composition of cooked fish and of canned fish

(Results per 100 g. of cooked and drained fish)

Cooking temperature	Cooking time	Water	Fat	Salt	Total
100°C. (212°F.)	5 min.	72·9	3·6	0·1	76·6
	10 min.	68·8	4·8	0·1	73·7
	15 min	68·4	5·1	0·1	73·6
130°C. (266°F.)	5 min.	66·1	6·8	0·1	73·0
	10 min.	63·4	8·5	0·1	72·0
	15 min.	52·3	18·1	0·1	70·5
100°C. (212°F.)	5 min.	64·7	7·8	0·1	72·6
	10 min.	63·9	9·0	0·1	73·0
	15 min.	64·0	7·7	0·1	71·8
130°C. (266°F.)	5 min.	63·8	8·2	0·1	72·1
	10 min.	61·5	10·1	0·1	71·7
	15 min.	52·5	17·0	0·1	69·6

Table VI. Cooking in oil

Weight of fish, water and fat contents per 100 g. raw fish

Cooking temperature	100°C. (212°F.)			130°C. (266°F.)		
Cooking time	5 min.	10 min.	15 min.	5 min.	10 min.	15 min.
I—Weight of						
Raw fish	100	100	100	100	100	100
Cooked fish	92·0	86·3	80·7	81·0	79·5	70·0
Canned fish	75·0	76·9	73·1	74·8	77·3	70·5
II—Water content of						
Raw fish	73·3	73·3	73·3	73·3	73·3	73·3
Cooked fish	67·1	59·4	55·2	53·5	50·4	36·6
Canned fish	48·5	49·1	46·8	47·7	47·5	37·0
III—Fat content of						
Raw fish	1·3	1·3	1·3	1·3	1·3	1·3
Cooked fish	3·3	4·1	4·1	5·5	7·8	12·7
Canned fish	5·8	6·9	5·6	6·1	7·8	12·0

During retorting, the sardine cooked in water or in brine loses in the form of exudate a certain quantity of water of composition which takes with it a small fraction of the salt absorbed during cooking. In exchange, an appreciable quantity of covering oil penetrates into the tissue of the sardine.

In passing it may be noted that except in the case of a very incomplete cooking time (10 min. in our experiments) the weight of the drained fish is almost exactly the same as that of the cooked fish.

These exchanges with the surrounding medium involve big changes in the percentage composition of the sardine in oil and yet the sum "water+oil+salt" remains constant, as shown by the example already cited of the sardine cooked for 50 min. The calculation of the constant is confirmed as follows:

Cooking in:	Water	Fat	Salt	Total
water	67·8	+7·0	+ 0·1	=74·9
15% brine ...	61·9	+6·7	+ 5·8	=74·4
25% brine ...	53·9	+9·5	+10·8	=74·2

These figures show that the water, fatty material, and salt are interchangeable, weight for weight, in drained sardines canned in oil—or at least apparently so. They show also that the most salty fish is also the most dehydrated, which is normal enough, but curiously it is also that which has absorbed most of the covering oil.

All these considerations, interesting though they are, do not alter the fact that a sardine cooked for 10 min. in a 25% brine contains nearly 4% of salt, which makes it inedible. In fact, from numerous experiments carried out to determine the optimum salinity of canned fish in oil it appears that 2·5% of salt is generally acceptable, with 3% of salt in the drained fish being acceptable in certain Mediterranean countries. However, apart from sardines cooked in distilled water, only the fish cooked for 10 min. in a 15% brine contains less than 3% of salt. It must also be added that under these conditions cooking is very incomplete and that it will continue in the can with the expulsion of a noticeable quantity of water of composition into the covering oil.

We have therefore reason to conclude that the method of cooking in a saturated brine, in spite of the advantages of an apparent simplicity, can only result in a sardine either too salty or insufficiently cooked and which must be dried before packing into cans.

Suitable method of cooking

It is, however, possible to propose a satisfactory method of cooking according to the facts we have established:

The sardines packed raw into a can which would serve as a mould (tinplate can or mould in stainless steel) would be cooked in a

(*Left*): **Cans containing cooked sardines being taken off the grills.** (*Right*): **Crates of sardine cans being removed from the oven after steam cooking.**

dilute brine of such a salt concentration that any excessive saltiness of the fish would be avoided, whatever the time of cooking. On removal from the brine boiler and after draining, the cans would be submitted to the action of hot air which would remove by evaporation the interstitial water retained by the cooked sardine. The "block" of fish would next be transferred to its final can and sterilised after oiling and sealing. The quantity of exudate found in the separated oil from the sardines canned before and after drying would show the time of cook required and the efficacy of the drying and would indicate any necessary alterations in these operations. We have not had the opportunity of trying the method just described. It is true that we are afraid that we may be accused of having spent too much time on a method of cooking sardines which is no longer of much practical importance.

It should be recognised, however, that our experiments throw some light on the action of salt on fish. They extend and complete the work which we have published on the salting and brining of sardines. Finally, this critical examination of the method of cooking in brine has allowed us to enunciate several essential principles of cooking, applicable to all cases.

II. COOKING IN OIL

For more than a century the French fish canning industry has employed frying for the preparation of sardines in oil. It is therefore very probable that everything has been said about this method, and all that remains for us to do is to assure ourselves that our own ideas on cooking apply to frying in oil just as we have shown them to be valid for cooking in brine or water.

The experimental manufactures were carried out in the following way. Into a bowl containing 5 litres of arachis oil heated to a predetermined temperature was plunged for various times a metal basket containing a kilo of sardines—beheaded, eviscerated, and simply washed for several minutes in running water. Two temperatures, 100° and 130°C. (212° and 266°F.), and three cooking times, 5, 10, and 15 min., were chosen. The sardines were actually plunged into the oil at 110°C. (230°F.) and 140°C. (284°F.), which reduced the bath temperature to 100° and 130°C. These are the temperatures which were maintained during the course of the cooking. After undergoing this treatment and draining the sardines were weighed, then filled into cans, covered with arachis oil and sterilised in the retort for 45 min. at 115°C. (239°F.) after closure.

The normal examination of the product for weights took place several days later. The analytical results and weights are contained in Tables IV, V, and VI.

Table IV shows the weights found at various stages of manufacture and on examination of the fish canned in oil. The results are expressed "per can" and each one represents the mean of five cans.

Table V gives the percentage composition and more particularly the water contents, fat and salt contents of the cooked fish and of the drained canned fish.

Table VI supplies the weights, water, and fat contents of the cooked and the canned fish calculated to 100 g. of raw sardine

(edible portion). This manner of expressing results permits some interesting comparisons.

Before attempting an interpretation of all these figures it should be noted that the sardines used for these experiments contained 73·3% of water, 1·3% of fatty matter, and 0·15% of salt. Their count was 30 per kilo.

Weight losses

During cooking at 100°C. the sardine loses from 8 to 19·3% of its weight depending on the time of cooking. It is again a matter of apparent losses determined by the difference between the weights before and after cooking, and it is necessary to correct them by adding the quantity of frying oil absorbed during cooking, about 2 or 3 g. per 100 g. of raw fish.

In all cases, cooking at 100°C. was very incomplete since we found from 18·8 to 8·8 g. of exudate in the covering oil on draining the canned fish. The actual total losses in weight suffered by the sardines during cooking and sterilisation, calculated on the basis of 100 g. of raw fish, were as follows:

Cooking temperature: 100°C. (212°F.)			
Cooking time ...	5 min.	10 min.	15 min.
Loss on cooking ...	8·0	13·7	19·3
Frying oil absorbed	2·0	2·8	2·8
Exudate after sterilisation	18·8	11·3	0·8
Total loss	28·8	27·8	30·9

As can be seen the total losses are similar whatever the cooking time and in spite of very different exudations.

This confirms the principle already mentioned that the water of composition of the sardine which is not eliminated by sufficient cooking is found in the can after processing.

We have stated that 2 to 3 g. of frying oil are absorbed during cooking. Examination of the weights of the canned fish in oil as well as the determination of fatty matter in the drained fish suggest a further absorption of 1·5 to 3 g. of covering oil during sterilisation. The total weight of oil absorbed varies from 4·3 to 5·6 g. per 100 g. of raw sardine.

The analysis of the results obtained by frying the fish at 130°C. (266°F.) is more interesting than the previous analysis as the conditions of experiment are nearer to actual industrial conditions.

The apparent losses in weight range from 19·0 to 30·1%, while the weight of exudate in the oil changes from 6·2 to 1·3 then becomes zero with a cooking time of 15 min. The quantity of frying oil absorbed during cooking varied from 4·2 to 11·4%. The total losses (cooking + sterilisation), expressed in terms of 100 g. of raw sardine, are as follows:

Cooking temperature: 130°C. (266°F.)			
Cooking time ...	5 min.	10 min.	15 min.
Losses on cooking	19·0	20·5	30·1
Frying oil absorbed	4·2	6·5	11·4
Exudate after sterilisation	6·2	1·3	0
Total loss	29·4	28·3	41·5

It should be noted that the total losses of weight actually incurred by sardines cooked for 5 and 10 min. at 130°C. are not appreciably different from those of fish cooked at 100°C. It cannot be otherwise if the cooking has been well done, just to its exact limit, without subsequently drying.

Given this essential condition, it may even be added that in general the total loss in weight such as we have determined is constant for a fish of well-defined composition, whatever the method of cooking and the nature of the cooking medium.

What then has happened during the 15 min. cook at 130°C. where the loss in weight has reached 45% during a single cook? (100 g. of raw sardines of 73·3% water content gave 70 g. of fried sardine containing 36·6 g. of water. The fish therefore lost exactly 50% of its water content).

This is the result of a circumstance which merits closer examination. At the fifth minute the sardines were insufficiently cooked as indicated by the presence of 6·2 g. of exudate in the covering oil. At the tenth minute the fish appeared to be just cooked, and normally the cooking should be stopped exactly at this point. Between the tenth and fifteenth minute the cells which form the muscular tissue burst and emptied out their contents under the action of heat prolonged beyond the optimum cooking time. In several minutes the sardine lost 18·8% of its water composition. In the same time the frying oil invaded the muscular tissue, dehydrated to the same extent as the cooking medium. It is no longer a matter of absorption of osmotic character responding to precise rules, but a mechanical imbibition by a tissue which has become porous.

This "accident" did not surprise us. We had seen it when studying cooking in steam followed by drying in hot air. We wished then to demonstrate the uselessness or even harmfulness of drying in hot air when cooking in steam is sufficient. At the end of the experiment we had obtained a sardine which was hard, fibrous, and dry, having the "wooden" characteristics which we had sought to reproduce.

During this "cooking and drying" the fish had lost 43% of its weight, and 100 g. of sardines of 76% moisture and 1% fat content had given 56·8 g. of cooked, dried sardines containing 34·6 g. of water, corresponding to a loss of 45·8% of its water content. The analogy with the results of cooking in oil at 130°C. (266°F.) for 15 min. seems clear. It is still more striking if the weight of frying oil absorbed is subtracted from the weight of fried sardine obtained.

However, we have not yet said that in order to induce this "accident" the sardines had been cooked in steam at 100°C. (212°F.) for an hour, and that the cook had been followed by drying in hot air (at 100°C.) for 5 hr., which corresponds in fact to 6 hr. cooking at 100°C.

In oil at 130°C. the same result was obtained in 15 min. This comparison suggests several ideas.

Frying not a simple process

Frying no longer appears to us as the simple process we had supposed. Cooking is so rapid that it becomes difficult to control; cooking for several minutes less than the optimum cooking time gives both

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FOOD PRODUCTION IN RUSSIA

The Soviet Meat Industry

In food production, Russia has a long way to go to catch up with the U.S.A., the goal of achievement for the party leaders. The following two articles review the present state of the meat industry and outline the ambitious refrigeration projects in the latest seven-year plan.

BEFORE 1929, slaughtering in the Soviet Union was carried out in antiquated slaughterhouses with no refrigeration and no facilities for utilising by-products. The modernisation of the industry started about 1930, when the construction was ordered of eight large central meat abattoirs in Moscow, Leningrad, Baku and other large towns, besides 49 medium and small meat establishments. By 1934, twenty large meat packing plants had been built and the basic capital of the industry had increased from 60 million roubles at the end of 1928 to 350 m. roubles at the end of 1933.

One of the refrigerated storage rooms of a meat processing plant in Moscow.

Moscow and Leningrad plants

The two largest plants, one in Moscow and the other at Srednoya Rogarka, near Leningrad, built at a cost of 55 and 72 m. roubles respectively, started working in December, 1933. The maximum daily capacity of the Moscow plant was planned to be 1,800 head of cattle, 500 calves, 6,000 pigs and 1,200 sheep, but this was later increased and capacity figures are now 3-4,000 cattle, 7-8,000 pigs, and up to 8,000 sheep. The number of people employed has risen from the 6-7,000 planned in 1933 to the present 13,000. Beginning in 1954, the daily production of meat and meat products has risen to 800 tons.

The sausage department of the Moscow plant was planned for a daily output of 60 tons in two shifts. According to official statements, this output has now been exceeded by over five times; it is not, however, known whether this means that the record output of 60 tons of sausages daily has been exceeded on five separate occasions or whether the daily output now amounts to 300 tons, which seems very unlikely.

The Leningrad plant was planned to have 50-70% of the capacity of the Moscow plant and is the second largest in the country.

Other plants

The U.S.S.R. possesses about 475 abattoirs with a production capacity of 12,000 tons of meat per shift, giving an average overall capacity of all the Russian plants per shift per plant of less than 250 pigs or the equivalent in cattle and sheep. The larger plants are fairly well equipped, but there are some 300 rural slaughterhouses of a primitive kind which lack even refrigeration facilities. Considering the vastness of the country and the inadequacy of transport, the number of meat plants is very small. It may therefore be assumed that secret butchering goes on in many country places. Some 240 plants have their own poultry packing sections, which together with 16 separate poultry packing plants are said to have a production capacity of 340 tons per shift.

Livestock supply

In 1956 the Soviet meat industry handled about 38 million animals, comprising 10·3 million cattle, 11·2 million pigs and 16·3 million sheep. In October, 1957, the official Soviet meat periodical, *Miasnaja Industria*, stated that "the average live weight of the Russian slaughter animals is smaller than in the U.S.A." and went on: "If the slaughter animals delivered in 1956 had been average fattened, the Soviet abattoirs could have produced an additional 800,000 tons of meat and fat." For the Russian leaders,

the U.S.A. is considered the goal of achievement.

Limited transport facilities

Transport of animals to the abattoirs causes continuous grievance. Transport is still the number one problem in Russia, and the Soviet transport system is highly inadequate, inefficient and extremely wasteful. Many of the breeding and feeding grounds are a long way from the market, and cattle and sheep are driven mostly on foot for 300 miles from White Russia and the former Baltic states, for example, to the Leningrad abattoir, and 500 miles or more to Moscow. Similar natural transport takes place from other inland regions such as Transcaucasia, Crimea and the Far East. According to official statements the average freight speed by railway is 6-10 m.p.h. Road transport is very limited. Furthermore, animals have to be kept from 3 to 7 days at abattoirs before slaughter, a costly business. The average live weight of slaughter cattle of 280 kg. (616 lb.) is low, and pigs are of the coarse type with overbuild, heavy forequarters and too much fat.

Meat production

Official Soviet sources have said that in Russia 1·33 tons of live weight is produced from every 100 hectares of arable land, while in the U.S.A. the figure is 3·3 tons. According to statistics published in *Miasnaja Industria*, in 1956 the Soviet meat industry produced 2,671,000 tons of meat (fresh and frozen), 764,000 tons of sausages, and 324 million cans of 0·3 kg. each. To improve food supplies, Russia has imported meat from abroad for some years, and in 1954 became the third largest meat importer in the world. In that year she imported from the free world something like 110,000 tons, which does not include imports from the satellite countries. This figure was 13 times the 1953 amount of imports from the West, yet this amount increased the domestic meat consumption by only 1 lb. per head during the year.

Equipment

The equipment and production methods of Russian meat plants are copied to a great extent from the American model. Although space is freely available and the size of building lots unlimited, multi-storey buildings are the rule. Recent investigations show that one-storey plants are cheaper to build and have greater productivity per unit of floor area.

In the model plants, multi-belt conveyors are used in meat boning and cutting; the cutting belts are equipped with shoulder cutters, travelling table band saws, circular rotating knives, etc. Moving top gambrelling tables are installed, together with machinery for removing skins. Slaughter lines with moving chain conveyors are often adapted for both pigs and sheep with separate viscera inspection tables.

Canning

In spite of great efforts, Russian meat canning has not made very great progress. In 1913, Russia had only five small meat canning plants, which by 1927 had increased to nine with a total production of 49 million cans of 0·3 kg. (10½ oz.) each. During the last war there were only 17 meat canneries. As a result of territorial annexations, meat plants in the Polish towns of Lwow, Chodorow, Grodno, Dubno, etc., and the Baltic towns of Riga, Tallin, and others increased the number of canneries to 32. Their production capacity is surprisingly low and is officially stated to be 1,270,000 cans per shift, making an average of some 40,000 cans per plant per shift.

The quality of canned meat is not high. Most of the production is ordinary cooked beef or pork with little seasoning. At a meeting of canning specialists from the Communist countries held in Odessa in 1956, over one thousand canned goods were assessed; Russian products could not compete in quality with those from Poland, Hungary, Czechoslovakia and other countries with the exception of China and North Korea.

For packing meat products cellulose film, paraffin waxed paper and folding boxes are used. Lacquered and lithographed cans and glass jars are extensively used for preservation; the glass jars are a true copy of the well-known Anchor cap, called in Russia the SKN cap.

Specialists

In the Russian meat industry, over 5,000 specialists with higher education and about 6,000 trained technicians are employed; this means that over the whole industry an average of some 10 technologists and 12 technicians are working in each meat plant. The main training institute for the meat and milk industries in Moscow has six special faculties, namely technological, chemical, mechanical, veterinary inspection, economics and planning. In addition there are the Technological Institute of the refrigeration industry in Leningrad and the higher technical schools in Odessa, Omsk, Frunze and Tashkent, giving altogether six centres of education for future specialists of some kind in the meat industry.

The salaries are very low according to Western standards. An experienced technologist earns 1,100 roubles a month, enough to buy 64 kg. (141 lb.) of beef at 17 roubles per kg. In the central model meat plants the workmen earn about 600 roubles a month.

Meat consumption

Official statistics claim that the home production of meat and meat products in 1956 was 32·3 kg. per head of the population, compared with 102·3 kg. in the U.S.A. These figures are held up as an incentive to greater output. The figures seem to contradict plain mathematics. Since the population amounts to over 200 million people, a simple multiplication by 32·3 kg. would require a production of the order of 7 million tons, twice the size of the present production of meat and meat products. But such an increase is at present unattainable for lack of slaughter animals.

The annual consumption of meat and meat products in Russia in practice amounts to about 15

kg. per person or less. It may be assumed that in the big cities, which enjoy continuous party preference, the consumption is greater than this, while in the smaller towns and especially in the country the population is very poorly provisioned and meat is unobtainable for long periods at a time. Even the production plans for 1960 will not greatly improve the meat ration of the average Soviet citizen, which in practice will secure an average yearly consumption of some 16 kg. of meat and meat products per person.

In spite of many drawbacks and lack of competition in price and quality, the fact remains that Soviet Russia has developed a modernised meat industry which is trying to catch up by all available means with the industries of other countries. The actual status of the industry is closely guarded and only after the Beria purge were articles by leading scientists published which discussed problems and mistakes. Even the few model plants which impress every layman are hardly accessible, contrary to the modern idea that food plants should always be open for inspection by the consumers of the goods.

Food Refrigeration in the U.S.S.R.

By W. G. Cass

Food refrigeration techniques, particularly quick-freeze methods, are being rapidly developed in the Soviet Union; great emphasis is being given to research into new methods and the improvement of existing plants and processes.

Research institutes

THE Refrigeration Research Institute in Moscow was established in 1930 and is now being thoroughly modernised. It comprises 16 departments with a staff of 185 scientists and 65 technicians. There are special laboratories for the study of fish freezing, ice cream manufacture, microbiology, dry ice production, and food transport. Two new refrigerants have recently been developed there. They are known as F.142 and F.143, the second being a development of the first. They have a b.p. of −48°C. and they are said to be very suitable for low temperature work.

The Meat Research Institute was also founded in 1930 and was greatly enlarged in 1948. It is concerned with histological and biological research, production and conservation problems, and packaging, and works with large meat plants throughout the country. In the samples and test section some 5 tons of meat are dealt with daily. The large library and information department has 70,000 volumes and about 187 Russian and foreign periodicals, and is the biggest of its kind in the U.S.S.R. The current research programme includes the continuous manufacture of sausages, the production of blood plasma for human use, the production of adrenalin and insulin from liver, and the development of a method to dispense with smoking by immersion in baths of synthetic phenol derivatives.

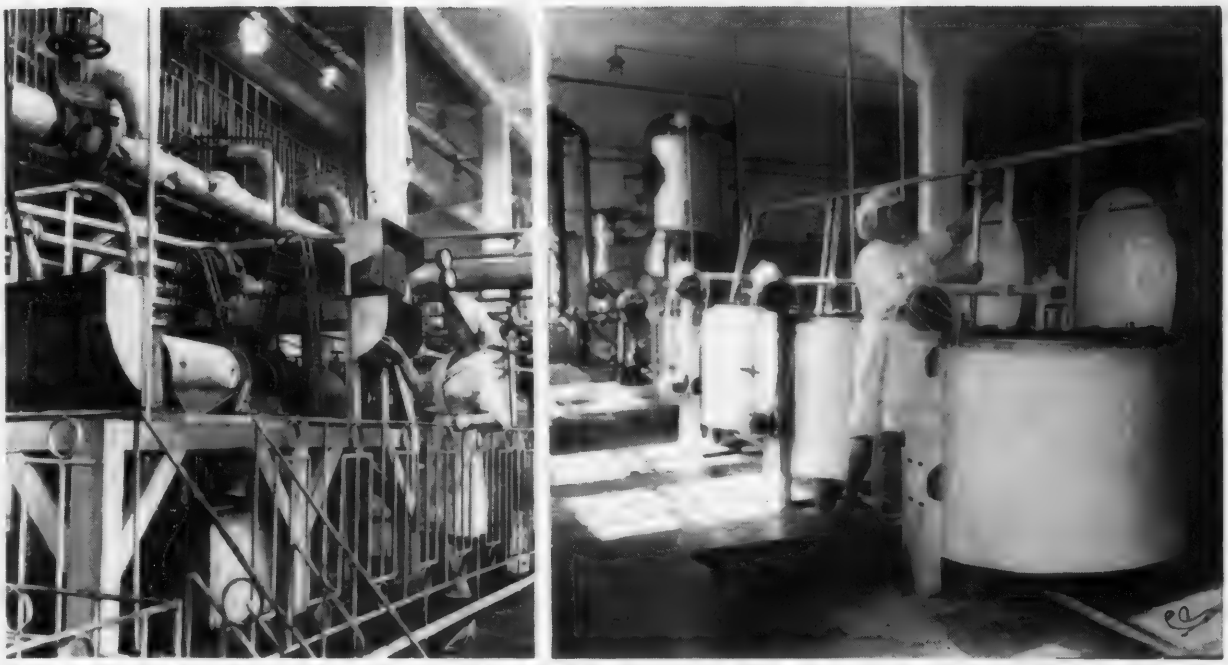
Ice cream factory

The Mikoyan Combine headquarters comprises a carbon dioxide and dry ice factory, an ice cream factory, and a large cold store. The ice cream factory uses calcium chloride/brine at −45°C. and is connected with a central ammonia refrigeration plant. Production in summer is said to be 90 tons per day in two shifts (16 hr.) and in winter about 60 tons. The three principal types of product are fruit flavoured ice without milk or fat, flavoured sherbet and fatted ice cream (8% fat). Some 40 varieties are grouped under these headings, including ice lollies. The cost per portion is 0·8 to 1·2 roubles. The total consumption in Moscow is estimated to be 50,000 tons per annum.

In the manufacture of ice cream in this plant, vegetable oil or fat is not used. Fresh milk is used to which is added melted butter and milk powder. After heating and stirring, the mix is sterilised in large drums holding 2 tons each, then filtered, homogenised and cooled to 20°C. The continuous worm freezers operate in conjunction with automatic and semi-automatic portioning and packaging machines.

Moscow cold store

The Moscow Cold Stores No. 12 was built in two sections during 1955-57 and has a capacity of 35,000 tons, part at −18°C., part at 0 to −15°C., and part at 2°C. The incoming meat is frozen in four freezing tunnels of 170 tons per day capacity. The construction of the cold stores is entirely of pre-stressed concrete units, with outer wall and inner shell between which is a 60-cm. thick insulated and cooled space. There is practically no load on the outer walls, all the weight being supported on pillars inside. Insulation material is chiefly glass wool bonded with bitumen. The 2,000 kW refrigeration plant has a capacity of



(*Left*) **Inside the Izmail Canneries, built on the banks of the Danube in 1954, where meat and fruit products are canned.** (*Right*) **A dairy plant in Stalingrad, which produces, among other products, ice cream. The mixer being operated appears to have no motor.**

3,600,000 kcal./hr. under normal conditions, and has 16 compressors, some made in Czechoslovakia and some of Russian make. The refrigerant is ammonia, and a radioactive source and detector unit, employing Co^{60}, indicates the level of liquid ammonia in the collectors.

Russian plans for 1959-65

In Russia hitherto, the quick-freeze process has been applied mainly to fish, but now other foods are to be included. In the meat industries, out of about 800,000 tons frozen, only 10,000 tons have been subjected to the quick-freeze method. Temperatures in the usual slow process have been −18 to −23°C., requiring 48 to 60 hr., and losses have reached 0·7 to 0·8% as compared with 0·3-0·4% in quick-freeze; that is to say, 3,000 tons of meat worth 40,000,000 roubles have been wasted. This applies mainly to carcasses and quarters. Prepared and packaged meat foods are still more important, and their production and sale are to be multiplied several-fold during the next few years. It is intended that frozen packaged meat foods shall reach 700,000 tons by 1965, and meat in block or quarter form, for further treatment, 800,000 tons. Quick-freeze methods will be used (2-4 hr.) for much of this output. All this will require much study of refrigeration technology, methods and apparatus, to find the most suitable for the many different kinds of food.

Quick-freeze will be still further developed in the fishing industry, the total yield of which by 1965 it is hoped will reach 1,300,000 tons (quick-frozen) or about three times that of 1957. Up to 900,000 tons of this must be achieved by extension of open-sea fisheries properly equipped with refrigeration plant and storage on board, leaving 400,000 tons for inland water fishing in the numerous lakes and rivers. In all some 600-700 new plants will be needed.

In the dairy industries special attention will be given to quick-freeze of curds or pot cheese (Russian *tvorog*) to ensure greater uniformity in consumption. Of the quick-frozen product in 1957 no more than 10,000 tons was made; by 1965 this will be increased to 150-160,000 tons.

The proper freezing and conservation of fruit and vegetables is also a most important industry that has hitherto been somewhat neglected in Russia, and refrigerating facilities are quite inadequate. According to some figures published by the All Union Research Inst. for the canning and other industries during the current plan some 25 new quick-freeze plants should be installed in the canning factories, with a total capacity of 110 tons per shift. By 1965 output should reach 40,000 tons, compared with only 8,000 in 1957.

It is not quite clear what is included in the food group called "culinary" (Russ. *kulinarn.*). Its development in the matter of quick-freeze is only just beginning, and is mostly limited to some form of fish product (*blyudo*). It must reach 25,000 tons by 1965. It is specially important for railway and airline buffets, etc.

Therefore the grand total for quick-freeze foodstuffs by 1965 should reach 3,000,000 tons. For such a programme much more attention must be concentrated by research institutes and others concerned on the development of greatly improved quick-freeze plant, including more mechanisa-

tion and automation, both in the actual refrigeration and in the various handling operations for transport and storage. There will be a greatly increased demand for packaging materials for frozen foods, such as cellophane and synthetic resin film, the production of which at present totals 7,000 tons per year.

Quick-freeze products are usually chilled to −18°C., and during transport and storage this temperature must be maintained. Yet, with many cold stores, especially for meat and meat products, the temperature is nearer −10 to −12°C. In refrigerated railway wagons the average temperature is not lower than −6°C., often involving much loss and inconvenience, for the supplementary cooling thus needed has a bad effect on quality.

The final link of the cooling chain is the refrigerator of the retail store, yet in Russia suitable refrigerated service counters amount to only about 10% of the total. Many shops and stores in the U.S.S.R. have little or no low temperature facilities, and the same is true of domestic refrigeration.

There is thus an urgent need for a large expansion of the refrigeration industry and the production of the necessary apparatus and appliances. Especially is this the case with the retail trade, and refrigerators for shop counters and display cases are very necessary. During the period ending 1965 output of these should be at least 30,000.

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Experimental Milk Drying Tower

THE University of Wisconsin in the United States has recently designed, built, and placed in the University's Babcock Hall a new type of experimental dryer for dairy and other food products. It is a 51 ft. stainless steel cylinder, 8 ft. in diameter.

Development of a high-quality whole milk powder and an engineering study which aims at improving future dryer designs are the main objectives of research with the new dryer. The work is being directed by A. M. Swanson, University dairy researcher, and W. R. Marshall, Jr., University professor of chemical engineering. They designed the experimental unit and will be in charge of its operation.

The State of Wisconsin produces more than 500 million lb. of nonfat dry milk in one year. At present, powdered products acceptable to consumers are made of skim milk and marketed as nonfat dry milk.

Dried whole milk which would taste like fresh milk when reconstituted, is the ultimate product for easing storage and transportation problems for dairy products in America. It is hoped that the specially designed dryer will make drying research to be much more easily controlled, allowing a wider variety of drying conditions than present dryers allow.

For instance, the great length and large diameter are needed for producing larger particles or aggregates. In the experimental dryer, milk can be sprayed in various places and observed at various stages of drying.

The tower contains facilities for operating with two temperatures at one time—hot in the middle and cooler on the edges, for instance. There are also several places to locate measuring instruments for wind flow measurement, temperature determination, and the like.

Early tests with the new dryer will be aimed at covering the fat on the surface of dried milk particles, and at the same time making the particles larger.

The dryer, which cost over £35,000, will also be used for research in drying chocolate and other food products such as soups and puddings.

Cooking Sardines

(*Concluded from page 153*)

an insufficiently cooked sardine and an abnormal exudate in the covering oil; cooking for several minutes beyond the favourable limit produces extensive dehydration of the fish which unavoidably compromises the quality of the product. All this would be of little importance if the optimum time of cooking were not determined by the size of the sardine. But we have shown that it is primarily determined by the fat content of the fish and that it varies, all other things being equal, according to whether the sardine is very fat or very lean.

The edible portion of the sardine contains from 55 to 78% of water and 0·5 to 20% of muscular fat. At the maximum water content, the minimum fat content operates, and vice versa. The sum "water+fat" in the raw sardine is approximately constant at 74%. It rises exceptionally to 78% in very lean sardines.

It is therefore a matter of establishing on these foundations a cooking process which is a function of muscular fat and water contents. The determination of fat in the factory is neither very rapid nor easy to carry out, while there are available at present various types of moisture meters which give the water content of a material in several minutes or even seconds with sufficient accuracy.

Otherwise, the experimental determination of the optimum cooking time presents no difficulty. It is sufficient to take as criterion the volume of the exudate in the covering oil of the canned product and to accept as upper limit 1 g. (or 1 c.c.) of exudate per 100 g. of prepared sardines.

The optimum time thus obtained will be a function of the water content of the sardines in use. Several identical experiments on sardines more or less rich in water will give a number of points which may allow a curve to be drawn.

(*In the succeeding article the authors deal with cooking in hot air and in steam, and summarise the results.*)

FOOD MANUFACTURE
ANNUAL REVIEW

BREWING

By J. Hoggan,*
B.Sc.(Edin.), A.R.I.C., Ph.D.(Edin.)

Barley and malt ★ Hops ★ Haze materials ★ Continuous processes Microbiology ★ Gushing ★ Future prospects

A maltster carrying out a routine examination of growing grain in a conventional flour maltings.

THE year 1958 has been notable for the large number of revolutionary developments in the industry and it would appear, therefore, that the emphasis which was placed upon scientific and technical research in earlier years is now beginning to be justified.

Barley and malt

The barleys of the 1958 season, although having rather high average nitrogen contents, in general have given lower values than the barleys of the 1957 crop. The causes of high nitrogen contents in barleys and malts, and the brewing value of these, were discussed at the Institute of Brewing meeting at Cambridge. L. R. Bishop stressed that the time and amount of nitrogenous fertilizer dressing were of first importance; late top dressing gave high nitrogen in the grain and what was required for best results was early addition to give increased yields. The effect of rain depended on when it fell; it seems that winter rain was probably useful as providing a reserve, spring rain was a disadvantage in that it removed nitrate and reduced yield, and late rain caused harvest difficulties. Rain in May and June reduced the nitrogen content of the grain; however, the figure was increased by high temperatures in June and July. Bishop pointed out that early sowing was most important in obtaining low nitrogen content, each day's delay in sowing increasing the nitrogen content by 0·01%. In this way, given the date of sowing and knowing details of rainfall and temperature, it was possible to predict the approximate nitrogen content; another possibility of prediction was from analysis of immature grains, a procedure which is adopted with hops to determine the date of picking.

Referring to the influence of high barley nitrogen on malting quality it was pointed out that it was difficult to interpret recent events because of the changes which had taken place in the varieties grown. It was not clear whether the introduction of Proctor was responsible for the difficulty in assessing the influence of high nitrogen or whether it could be put down to the weather. Fortunately, high nitrogen values did not seem to be causing the anticipated difficulties in securing modification. The influence of the copper break had been shown to prevent any definite relation being demonstrated between the level of barley nitrogen and the level of nitrogen in the beer; it also had to be noted that it was quite possible to have too little nitrogen in wort. It was important to observe the behaviour of the new barley varieties without being misled by the older ideas which were, in any case, not necessarily valid.

In discussing the brewing value of high-nitrogen malts, R. D. Hall revealed that he had carried out brewing trials with high-nitrogen (1·8-1·9%) and low-nitrogen malts (1·4%). It was found that those with high nitrogen contents gave the higher values for cold-water extract, permanently-soluble nitrogen,

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colour and diastatic power, but lower values of index of nitrogenous modification. On the worts, the high-nitrogen malts gave the higher values for hexose, sucrose and dextrin, but lower values for maltose and maltotriose, and lower maltose/dextrin ratios. The nitrogen content of the malt did not influence the final pH of the beer whilst, analytically, the foam stabilities were identical. It was also found that high-nitrogen malts gave rise to beers with a greater bitterness although the isohumulone content in both series was the same. Hall suggested that the higher level of surface-active proteins in high-nitrogen beer might accentuate the bitter taste of iso-compounds which, like the α-acids, are often associated with proteins. Haze development was significantly reduced in the high-nitrogen beers.

At the Brewing Industry Research Foundation, germination in dormant barleys has been stimulated by treatment of the grain with various substances, which include gibberellic acid, hydrogen sulphide and kinetin. These substances seem to act at different points in the chain of events leading to successful seedling growth. Germination in highly dormant samples has been in the region of 90% in the presence of gibberellic acid and hydrogen sulphide, but there was no response in the presence of either compound alone. Less dormant samples, however, responded readily in the presence of either substance. It has been suggested that sulphydryl compounds act by removing inhibition imposed by the outer layers of the corn, whereas gibberellic acid acts directly on the embryo. Results obtained with the latter compound, and kinetin, would appear to indicate that they act at different stages of seedling growth. For example, samples which responded to 25 p.p.m. of gibberellic acid also germinated in the presence of kinetin, but when 100 p.p.m. of acid was necessary, kinetin was much less effective. Neither of these two substances greatly stimulated the germination of water-sensitive barleys. A group of American workers has suggested that bacterial proliferation in the presence of excess water is correlated with inhibition of germination and they stress the importance of controlling microbiological factors in germination studies. They ascribe water-sensitivity to the fact that the microbial flora of the grain compete for oxygen and secrete exo-toxins which inhibit barley germination. It is claimed that surface sterilisation of the grain with sodium hypochlorite or mercuric chloride eliminates water-sensitivity.

There has been some very interesting work on the application of substances which will restrict root growth and the growth and respiration of the embryo, and so decrease malting loss. These developments arise from the earlier findings that the full modification of the barley endosperm demands the presence of the embryo in the corn for only three days out of the total malting period. These observations led to methods whereby the growth and respiration of the embryo can be restricted deliberately without prejudice to the malting process as a whole. The use of coumarin at concentrations around 100 p.p.m. was found very effective in reducing loss but it would appear that coumarin degradation products are responsible for an unpleasant taste in the resultant beer. However, its action in the present connection remains of outstanding scientific interest in pointing a way to improved conditions of malting. Addition of potassium bromate to steep liquor has been shown to restrict malting loss at the expense of respiration and there were indications of increased extracts. No detrimental effect on the finished malt has been observed to date. Another of these methods which would appear to possess practical advantage on the commercial scale is that involving the addition of sodium chloride (0·5%) to the steep liquor.

Hops

There is considerable scope for improving the efficiency of hop utilisation as a result of very extensive researches into this problem. It has been shown that, within certain limits, by varying the hop rate, the hop utilisation decreases as the amount of hops added to the copper increases. Furthermore, great benefit is claimed from hops by raising the temperature in the copper to 106°C., the optimum temperature for the isomerisation of α-acids. Continental brewers are known now to be extracting hops in the copper before the wort is run in. Briefly, two methods appear to be in use, one employing water adjusted to an alkaline pH and the other water at an acid pH value. More revolutionary procedures have recently been suggested. These involve the irradiation of the copper by ultrasonic waves by which means extractions of up to 30% more bitter substances are claimed. The ultrasonic irradiation probably brings this about by removing undesirable colloids which are likely to interact with α-acids and iso-compounds. This may be related to the fact that 3·5% more flocculum is deposited by this treatment. The duration of exposure to the waves is 30 minutes starting at the beginning of the boil. Behaviour during fermentation is influenced in that primary fermentation occupies one day less and the secondary fermentation is less active. These beers when analysed showed that the bittering power of the hops was increased 10-30%, the extent of this increase depending upon the variety of hop employed and the method of its addition. The hop flavour is less pronounced, but more delicate, and the irradiation appeared to accentuate the aroma imported by the hops.

Referring now to the fact that proteins, α-acids and iso-compounds appear to be closely associated during copper boiling, it has been shown that mashing at lower temperatures, so ensuring a greater degree of proteolysis, improves hop utilisation. With respect to the influence of yeast, losses of iso-compounds during fermentation appear to be greatest when Burton type or powdery yeasts are employed, these losses being less with more flocculent strains. However, it is unquestionable that the less traditional procedure of adding pre-formed iso-compounds to

wort or beer would lead to a substantially increased hop utilisation.

A very quick method of measuring the isohumulone content of a pale ale has recently been devised. This simply involves measuring the increase in foam stability of the beer to which 10 p.p.m. of nickel has been added. It appears that the approximate isohumulone content is equal to the number of seconds in the half-life of the foam divided by two. However, we will see later that the commercial use of nickel, with a view to improving head retention, could have serious consequences.

Haze materials

Compounds known as leucoanthocyanins or anthocyanogens have received a great deal of attention lately. It has been shown that these substances which have been detected in malt and hops are present to a large extent in beer chill haze. However, the indications are that these tannins or polyphenols responsible for non-biological hazes are derived solely from malt. The corresponding compounds of hops, which differ chemically, are largely removed in copper break. Concerning haze-formation, a possible relation with lignin is suggested because lignin derivatives have also been recognised in haze material. In other words a further connection between haze and the husk of malt is suggested. The reality of this latter relationship has been directly demonstrated in brewing trials carried out using polyphenolic fractions obtained from malt husk.

At the Brewing Industry Research Foundation it has been shown that these polyphenols responsible for the formation of chill-haze can be selectively removed by certain resins. The most effective is a German form of nylon (Perlon), while nylon 66 and nylon 11 (Ralsin) have also been successfully employed. So far, the most satisfactory way of effecting adsorption has been by addition at bottling. Addition of large quantities of nylon to storage tanks has also been employed, whilst filter sheets incorporating nylon are being prepared. It is claimed that the shelf-life of a beer can be prolonged by such treatments regardless of oxygen.

Another product claiming to effect a similar result is now being manufactured in this country. It is an aqueous solution of polyvinylpyrrolidone (PVP) but, unlike nylon, this compound is not recoverable. Already in America this substance is employed to a large extent, apparently with startling results. Polyvinylpyrrolidone is a selective agent for the precipitation of those polyphenols responsible for fine, cold break and chill-haze formation. In this way it is thought that when added to the copper, it leaves colloidal proteins or peptones in suspension, these being largely responsible for palate fullness of a beer. As a consequence of its action, only half the usual amount of trub has been observed in the fermenting vessels. This could be of great importance because it would mean that there was less material present to take up dissolved oxygen which is so necessary for the growth and action of the yeast. However, it appears that less "blackhead" is obtained on the foam in the fermenting vessels, and this might seem unfavourable to those people who believe that "blackhead" results partly from the removal of excess copper from the wort. By dint of its greater removal of trub it is claimed that PVP effects an appreciable saving of hop bitter substances. With regard to bottling problems, such a treatment is thought to prevent the formation of nuclei in beer which induce "gushing." Although polyvinylpyrrolidone does not appear to have been employed on a large scale in this country, small scale applications have found it to be ineffective with British beers.

Continuous mashing

In this country the development of continuous processes is receiving considerable attention. Developments to date are for the most part in the experimental stages, but it is known that most of the processes mentioned below are in practical use in other countries.

An apparatus has been developed at the Brewing Industry Research Foundation and workers there have devised a new type of wort filtration. At the bottom of a cylinder containing the mash a rapidly rotating disc with a clearance of one thousandth of an inch has been found to permit wort to pass but the grains are held back. Filtration occurs only when the disc is spinning, this also providing a useful pumping action. The temperatures employed are, naturally, lower than those in the conventional mashing system. Spent grains are passed by a screw conveyor up an inclined cylinder, at the top of which they fall into another cylinder in which they are washed with hot liquor. The "spargings" are drawn off in their turn by another spinning disc filter situated at the bottom of this last tube. It has been found that the worts contain more suspended matter, but otherwise their compositions approximate to those of the corresponding batch of mashed worts.

Continuous boiling

The plant consists of an underback, large enough to ensure a constant flow, which serves as a reservoir for the heat exchanger (which is divided into two sections, the regenerative and steam-heated sections) and lastly the hop extraction vessel. Wort from the underback is pumped into the regenerative section and thence to the steam-heated section where it is raised to the desired temperature and held thus for a short time. The temperatures to which the wort must be raised are, understandably, very high and necessitate the application of high pressures. In this process it is usual to return some of the wort to the regenerative section to heat up the incoming wort from the underback. This is then so blended with the remainder in the steam-heated section to give a pre-determined temperature. The wort at this temperature is then passed on to the enclosed hop extraction vessel and the hops extracted under a mod-

(*Left*): **A brewer checks the gravity and temperature of beer being fermented in a Burton Union set.** (*Right*): **Hops being added to a beer storage tank.**

erate pressure. Advantages of this system are very attractive since a very great saving in heat is possible, hop utilisation is increased and there is the increased saving in space.

Continuous fermentation

Wort of a given gravity is run continuously into the first of a series of inter-connected vessels at an optimum rate, whilst beer is emerging from the last of the vessels at the same rate. It has been found that more than one vessel is preferable because the efficiency of the system is decreased to a great extent if the yeast is continually allowed to remain in a medium of low *p*H and high alcohol content. A two- or three-vessel system is considered ideal and it is important that each vessel be of similar capacity, otherwise efficiency of beer production is decreased. For a constant rate of flow of wort from the reservoir both the yeast concentration and the gravity of the fermented wort maintain steady values in any one vessel. From the last vessel in the series beer of the desired gravity and yeast concentration passes into a beer receiver. Therefore, it is thus possible for the brewer to obtain a very great control over the process and over the condition of the beer at rack by determining the original gravity of the wort, working temperature, rate of flow and the number of vessels required to produce maximum efficiency of beer production.

The process has proved itself advantageous in that the increased rate of beer production (as much as six times at 30°C.) in no way alters the chemical compositions of the beer when comparison is made with beers obtained by the batch process. It would also appear that there is a slight saving of isohumulone, while yeast vitality is in no way affected by the long periods of operation. However, the process does tend to be rather inflexible because it is not suitable for outputs of less than 100 barrels per day. In practice there would be the great problem of maintaining sterility in the wort receiver.

Continuous or hot bottling

Beer from the filter or receiver is transported to a plate-heater and subjected to and maintained at a pressure which depends upon the desired pasteurisation temperature and upon the carbon dioxide content of the beer. A de-aerating device is incorporated in the heater. A characteristic of the process is that the beer is conveyed by the shortest possible route to the filler. From the heater the beer enters a pre-pressurised and pre-heated filler. It is claimed that any beer can be filled hot provided that the necessary pressure in the filler is regulated for the particular carbon dioxide content at the selected filling temperature. Fob is completely depressed and there is thus no fear of gas loss. A construction characteristic of the hot-filler is the absence of filling tubes, the beer instead being run quietly down the walls of the pre-heated bottles. Thus, exposure to oxygen is minimised to the few seconds it takes to fill the bottles. However, if the throughput of the filler is reduced or even stopped, the pasteurised beer is recirculated to the unpasteurised beer tank. This may have the effect of imparting undesirable pasteurisation flavours to the beer if overdone. The bottles must be filled nearly to the brim to allow for the contraction of the beer volume during cooling. It is convenient that the contraction of the beer is greater than that of the bottle and so this results in the formation of a weak vacuum in the head space which becomes filled with carbon dioxide. The tendency to throw an oxidation haze is thus reduced to the absolute minimum. The colloidal condition of the proteins in the beer remains almost unchanged owing to the scarcely discernible oxygen content. Furthermore, by feeding the beer directly from the pasteuriser to the filler, infection troubles between these two points have been overcome, and so the biological stability of hot-filled beers remains unobjectionable. A further advantage of such an installation is the great saving in space. However, it is felt that there is need for specially manufactured bottles which have

been tested for high pressure resistance. It is claimed that bottle breakages are much less in such a continuous process.

A continuous process has also been introduced into the baking industry in the form of a continuous yeast propagator, and so, one day, such a development may be employed in the brewing industry. This does seem an extremely futuristic hope since at the present day even conventional culture plants are all too few.

These leanings towards continuous processes are very attractive and stimulating, but, as yet, the barrier presented by the conditioning process is still a formidable one. With the present rapid advance in technical development it would appear to be only a matter of time before a solution to this problem is found. Ultrasonic irradiation may come to our rescue.

Microbiology

Research into the problem of the agglutination of yeasts has indicated that this tendency is not strictly dependent upon the magnitude of the surface charge of the cells. It has been suggested that those aspects of the surface structure which control agglutination are not connected in any simple way with the overall pattern of surface charge. Loss of flocculence has been shown to coincide with the removal from the cell wall of a compound consisting of mannan and protein. On the evidence produced it is inferred that this material carries one or both chemical groups thought to be involved in agglutination.

With respect to the reaction involved in the fining of beer, the evidence is rather clearer. In short, it has been concluded that the interaction between yeast and finings is governed essentially by electrostatic forces and the readiness of yeasts to form "flocs" with finings is related to their electrophoretic mobilities. It would also appear that "bound" phosphate groups also play an indirect role in fining. The interesting observation is made that whereas the phosphorus content of the cell walls varied enormously from strain to strain, differences in total phosphorus of the cell were less marked. In agreement with this it is noticed that cells starved of phosphorus show a marked inability to fine and, consequently, a marked reduction in electrophoretic mobility.

The past season has been notable for the high level of *Acetobacter* infection in the industry. It is difficult to ascribe this to any one particular feature but it is interesting to note that high-nitrogen malts have given higher dextrin figures and maltose/dextrin ratios than those obtained from low-nitrogen malts. Again, it may have been the result of the slow sale of beers during the summer months, thus allowing more prolonged contact with air. However, *Acetobacter* is a very difficult organism to suppress because of its very rapid growth in pitching yeast and, furthermore, certain strains, e.g. *Acetobacter capsulatum*, are very resistant to sterilising agents such as quaternary ammonium compounds. A high concentration of this strain is known to have serious effects when accompanied by a high dextrin content in the beer. With the exception of sulphite treatment, there is no convenient or quick method of eliminating *Acetobacter* from pitching yeast. In such a situation it would be of great advantage to have the necessary plant for propagating yeast. In this latter respect more and more breweries are coming round to this way of thinking. However, there are problems here also, such as the capability of one strain to furnish all the necessary requirements or the question of employing the plant to maintain the correct balance of strains in a pitching yeast. The severity of this problem will obviously differ from brewery to brewery.

With the development of newer techniques it is now possible for the microbiologist to obtain a quantitative estimate of the level of infection of a pitching yeast by *Lactobacillus*, *Acetobacter* and *Flavobacterium proteus*. Basically, the methods employed all depend upon the use of the antibiotic actidione which inhibits brewing yeasts, thus allowing the bacteria to develop fully. The media make use of the physiological differences of these organisms, thus allowing the growth of cells of only one group of bacteria.

Overfoaming of bottled beer

This is now referred to as "gushing" and is a common source of anxiety to the bottler, especially abroad. "Gushing" is adjudged to have taken place when beer is expelled from the bottle on opening. Research has shown that this will occur if the beer is severely chilled and physically disturbed in bottle, and is accentuated if the air content is not low. There have been investigations into the effects of nickel, iron and cobalt and it appears that nickel and iron will promote "gushing" only in the presence of isohumulone, neither the metals alone or the isohumulone producing this effect. No gushing is observed with cobalt in similar circumstances. It should be significant that both nickel and cobalt have a stabilising effect on head retention.

Future prospects

Brewers are continually conscious of the need to strive towards a greater knowledge of the materials with which they work. It seems odd, therefore, that greatest emphasis has been given to the development of continuous methods. In other words, they may save space, labour and time, but the brewers' old problems still remain. However, technical and scientific knowledge is advancing so quickly, the day may not be so very distant when beer will be produced by, or the process reduced to, the conversion of predetermined quantities of starch and proteins by enzyme preparations in the "mash tun," boiling the digest with hop extracts and the necessary alcohol produced by fermentation with solutions of yeast enzymes. In conclusion, however, we can expect that the product will not have the same appeal as it had "in the old days!"

(Left): **Examining a centrifugal in a flour mill for insect infestation.** *(Right)*: **Preparing for an experimental fumigation under gas-proof sheets.**

Insects and Stored Food

World Losses and Control Measures Surveyed

By E. A. Parkin,* D.Sc., D.I.C., M.I.Biol.

Increasing population and rising living standards make imperative the elimination of losses caused by insects. In this article the extent of world losses is reviewed, control measures outlined and sources given from which advice may be obtained.

THE population of the world is now estimated as around 2,600 million, a figure which is increasing faster than the anticipated increase in food production. At the same time the world at large is looking forward to increased standards of living of which the most important is more food. There is clearly a practical limit to the amount of the earth's surface from which food can be produced, so there arise the needs for improved farming methods to increase production per acre, and for investigating novel methods of food production using unusual biological organisms or chemical processes. The need for a considerable increase in food production is fairly obvious, and those who concern themselves with the future problems of existence on this earth are well aware of it, but the need to conserve what has been produced and to minimise deterioration of crops between harvest and consumption is only slowly gaining recognition.

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Stored products

Foodstuffs may be broadly divided into perishable and non-perishable, the former generally requiring special handling, marketing, and transport to distribute them to the consumer whilst they are still fresh. The non-perishable foodstuffs, on the other hand, can be stored for considerable periods and include such things as apples, potatoes, and "stored food products." The last named may be distinguished from the other groups by having a moisture content of some 20%, or less, which makes possible storage periods of up to several years. The commonest form of deterioration among the group of products with a moisture content above 20% involves fungal infection, whereas the group with the lower moisture content suffers mainly from insect infestation.

The most important groups of stored products are the raw and processed forms of cereals, pulses, oilseeds, dried fruits and nuts, spices, cocoa, coffee, tea, etc., together with some animal products. It must be emphasised here that the stored-product entomologist is concerned as much with the processed products and their stages of manufacture as with the raw materials, and his interest is, therefore, extended to problems of insect infestation during and after processing. In consequence, his background knowledge must cover post-harvest processing and storage, and he concerns himself little with agricultural problems except where a product may be infested before harvest by insects which can continue their depredations in the store after harvest. Moreover, stored products form an important part of international trade and the problems of spread or increase of infestation during transport loom large. Stored-product entomology may therefore be re-

garded, not as an extension of agricultural entomology, but as a subject in its own right which concerns itself with all aspects of insect infestation in all the ramifications of storage, transport, processing and marketing of the appropriate crops.

Extent of losses

An estimate of total losses is extraordinarily difficult to obtain, but a meeting of experts, under the auspices of the Food and Agriculture Organisation[1] concluded that an average loss of 5% of the world's production of harvested foodstuffs was a conservative figure. This means that, taking the present world population as 2,600 million, enough food is being lost to insects to feed another 130 million people at the average subsistence level and at no additional cost because the labour and outlay involved in growing this food have already been expended. This figure of 130 million may be doubled if account is taken of the additional depredations by rodents, similarly estimated as accounting for 5% loss.

Because the activity and rates of increase of insects are largely conditioned by temperature, infestation of stored produce will naturally be greater in warm climates than in temperate. Losses of 25% or more of edible material are common in the tropics during a few months of storage, although the true extent of loss is all too often obscured by the retention in the raw product of large quantities of insect remains and excrement. A side effect of the large number of individual grains and seeds that may be damaged when infestation is severe is interference with the germinative power of seed stocks and consequent reduction in the next harvest. Many examples of losses and damage by insects to stored crops have been cited by the author elsewhere,[2] but two more recently published estimates may be mentioned to give an idea of the magnitude of the figures involved in tropical and subtropical countries. D. Barnes[3] has reported that losses of maize through insect damage after harvest in Mexico have been put at 15-25%, although he thinks this is on the high side. Nevertheless, even if the losses were so low as 5%, the 1954 maize crop would have suffered a depreciation of 225,000 tons, valued at about 10 million U.S. dollars. In Kenya, careful assessment by S. Kockum[4] led him to estimate the average loss in 1952 of crib-stored maize as 9·6% of the weight in 4 months, rising to 23·1% in 6 months. In the untreated part of an experimental crib of cob maize, there was an increase in the number of damaged grains from 1·12% at the start to 91·0% after 10 months' storage. The application of insecticidal treatment since 1953 to some 10% of the crop has resulted in a presumed saving of about 15% in weight which, in turn, is interpreted by Kockum as an annual gain to the farmers of around £300,000; there is also the corresponding increase in available foodstuff.

Losses in the temperate zone are generally much smaller, but heavy losses do occur occasionally. One must always bear in mind that losses are not by any means directly related to the amount of product eaten by the insects. Æsthetic feelings, which become more potent the higher the standard of living, can well lead to condemnation of foodstuffs which are seen to contain insects or to show signs of insect activity, such as webbing, even though an insignificant portion of the foodstuff has actually been consumed by the pests. Indeed, instances are known when costly measures have been necessary to process foodstuffs for the removal of insects that did not attack the food but found their way into it from another heavily infested product.

As has been discussed in detail by Freeman[5] the losses caused by insects to stored foodstuffs can be suffered at all stages of storage and handling, and can be very complex. Moreover, some forms of loss are not really assessable in terms of money. For instance, if a manufacturer were so unwise as regularly to supply infested produce he would rapidly lose the goodwill of his customers with devastating effects on his business, but unless he were the sole manufacturer of the product his loss of trade would be his competitors' gain, and the effect on the industry as a whole would be nil. So long as there is a potential threat of loss of goodwill, however, the manufacturer will have to take control measures against insect infestation, and the cost of these measures must rank as a financial loss attributable to the insects. Even the cost of sweeping and cleaning must be counted as losses so long as neglect of these precautions leads to an increase of insect infestation.

Extent of infestation

In the U.K., the mill moth and the biscuit beetle are common and troublesome in retailers' and wholesalers' stores. In factories the commonest pests are the mill moth, warehouse moth, and flour beetles. The moths are particularly troublesome because not only do their caterpillars spin webbing which may block chutes and cause expensive shut-downs for cleaning, but the adults can fly, and therefore infest foodstuffs in factories and mills at any time from the intake of raw material to the despatch of the finished product. Since minute quantities of infestable debris can satisfy insects throughout their whole existence, from the egg to the adult, insects brought in with raw materials may breed in the dust of produce that settles on beams and in odd corners. It is in such places that the endemic infestations are maintained, and failure to appreciate this is presumably largely responsible for lack in improvement in design of factory and mill machinery to obviate these weak spots.

At various times in its history, produce is subject to some risk of cross-infestation during transport, and frequent cleaning of lorries and wagons is necessary to avoid accumulations of spillage in which insects may breed; food residues pressed into crevices between floorboards are a weak spot

Two aspects of the work of the Pest Infestation Laboratory at Slough. (*Left*): **Collecting insects from mature cultures to set up new ones and maintain the stock of insects for research.** (*Right*): **Apparatus for automatic scanning of paper chromatograms prepared from insects treated with radioactive insecticide.**

here. Opportunities for cross-infestation are also good in port warehouses. Many products move fairly rapidly through such warehouses, but others stay for long periods for lack of other storage space, and are then subject to attack, not only by cross-infestation, but also by the endemic infestation of beetles, and especially moths, that seem to be so well able to maintain themselves in these storage premises over the years.

Much stored food in the U.K. is imported and a significant amount arrives in an infested condition, either because the foodstuffs were exported infested or became so by cross-infestation during the voyage. Zacher[6] has pointed out that in 1954 four million tons of grain were imported into Germany of which he estimates that 40-60% was infested by beetles and that some 2,000 million beetles were thus imported. Insects are particularly active in warm environments, and the combination of tropical temperatures during loading and the sustained heat in some holds close to the boilers encourages multiplication and spread. In the tropics insects are often so numerous and their activity so great that it is extremely difficult to organise and apply effective control measures to prevent infestation. Moreover, up to the present there have been too few workers to investigate properly the possibilities of control and the best ways of making use of the existing methods. However, advance has been made here and there showing that, with skill and patience on the part of research workers and sympathetic backing by official and commercial trade and export organisations, the level of infestation in exported produce can be markedly lowered. Any progress will, however, be welcomed by the importer since it helps to lighten the burden of risk of infestation that he now has to carry, including the risk of having to treat the goods before sale or processing.

The import of infested goods is a problem important to traders and manufacturers who may re-export to another country where standards of food hygiene are rigidly enforced and may lead to the rejection of a parcel on arrival. Fortunately, this has not happened often, but the risk is always present and cannot be overlooked.

Control measures

In the past twenty years tremendous advances have been made as a result of the introduction of methyl bromide, the mixtures of chlorohydrocarbons, and phosphine as fumigants, and of DDT, lindane, dieldrin, and malathion as the main contact insecticides suitable for control of stored product insects. Other promising insecticides await fuller evaluation. Techniques of application have also improved, the most outstanding development in fumigation being the use of gas-proof sheets, and in contact insecticides the introduction of water-dispersible powders and smokes and greatly improved mechanical applicators. In spite of these advances, progress often seems all too slow to the research workers who are aware of the problems which still await investigation or which appear virtually insoluble with the available insecticides and methods for applying them.

There seem to be two main reasons for the slowness of the advance—namely, the relatively small number of workers engaged in this field of research and the complexity of the investigations needed to assess the potential value of any new insecticide. A third difficulty is that of obtaining suitable facilities for full-scale trials of control measures which seem promising on the basis of laboratory investigations. The first and last of these difficulties can be resolved when greater recognition is given to the importance of stored-product insect control and to the worthwhile return which can come from application of the results of research. The second difficulty—namely, the complexity of the investigations—cannot be overcome in this way since it is based on immutable features of insect biology, differences in the relative susceptibility of the different insect species to various insecticides, the toxicity of

insecticides to mammals, etc., the liability of foodstuffs to taint and contamination, and so on. This means that each insecticide ought to be evaluated against each insect species and sometimes against each developmental stage of the species. Some insecticides available for insect control in agriculture and known to be very toxic to many species of stored-product insects cannot be used in proximity to foodstuffs because of their very high toxicity to man. Furthermore, certain products are known to be very susceptible to taint and doses low enough to avoid any risk of taint or contamination in a product may consequently be too low to kill the insects concerned. The application of insecticides within buildings is also more hazardous than their application in the open, and this again may preclude the use of some compounds highly lethal to insects.

Resistance to insecticides

Most readers will be aware that, especially in the field of public health, certain species of insects, notably the house-fly, have defended themselves against man's attack with insecticides by developing strains which are scarcely or not at all affected by certain insecticides at the levels of dosage which it is practical, economic, and safe to apply. If a population of insects is exposed to a dose of insecticide which will kill most but not all of the individuals, there will be a tendency for the progeny of the survivors to have a higher average resistance than the parent population. If selection by the same insecticide is maintained for many generations the strain will become more resistant to an extent which cannot at present be predicted but which must be determined by observation and experiment. In some instances there is very little increase in resistance, the increase probably representing only the selection of a strain of generally more robust individuals, hence referred to as "vigour tolerant." In other instances a strain is selected which is so resistant that the insects comprising it are virtually immune from the effects of the insecticide and are certainly so under the limiting conditions of practical dosage. Fortunately, no intensely resistant strains of stored-product insects have yet been reported in the field, but there have been indications that they may be on the way. The methods of insecticidal application in general use in warehouses are such as to make it quite conceivable that selection of insects for resistance could occur. If a stock of insects has not already been subjected to selection for resistance to any insecticide, selection pressure must be applied usually, but not always, to a considerable number of generations before resistance becomes established at a relatively high level. Stored-product insects are generally very much slower in breeding than flies and mosquitoes, so resistance will take correspondingly longer to become established in practice. Nevertheless, since the risk is evident, there is good reason to investigate the possibility of inducing resistance under the artificial but more controllable conditions of laboratory breeding. Because of the amount of labour and length of time involved, the special difficulties imposed by the slow rate of egg production, and the ever-present risk of losing the stock through exposure to over-dose, this type of research has not been eagerly taken up by stored-product workers. The very few investigations with fumigants and stored-product insects have not so far revealed any degree of induced resistance greater than could be accounted for as vigour tolerance; the one or two instances of potential development of higher levels of resistance have been concerned with the contact insecticides.

Importance of hygiene

The mention of insect control immediately brings thoughts of the application of chemicals, but chemicals should always be considered second to hygiene. Hygiene includes careful preparation for the receipt of goods into store by thorough brushing out of the storage space, or better still, cleaning with a vacuum cleaner; attention must also be given to the removal of accumulations of dust, etc., from the tops of beams and from behind skirting fillets. Goods should be neatly stacked on arrival with free space all round so that each side of the pile can be frequently and easily inspected for signs of infestation and, if necessary, access is available for treatment. An attempt should be made to segregate clean from infested goods, and a plan of turnover be followed so that infested goods go out before clean, and older stock before newer. Any rebagging that may be necessary should be into clean disinfested sacks. The warehouse floor should be frequently swept and no spillage should be allowed to remain. Sweepings and debris must be removed from the store and burned immediately. Care must also be taken that partly manufactured foods that may be stored for a few hours or days between processes are suitably protected against infestation and that bagging-off spouts are closed by a slide or cover at the extreme end during stoppages at night or over the weekend. Not only can the conscientious application of hygienic measures make a considerable contribution to the prevention and control of infestation, or occasionally be sufficient in themselves to avoid attack, but they are also an essential preliminary to the application of other control measures.

Choice of treatment

It is not possible in the compass of this article to attempt any detailed analysis of the factors that govern the choice of chemical control measures. Generalisation is none too easy and the choice of treatment is, as often as not, determined by a particular set of circumstances. The selection of the most suitable of control measures will depend among other things on knowledge of the species of insects concerned and the kind of damage done, the likely rate of increase of damage, the relative resistance of the insects to the insecticides available, the possible effect of the type of stowage on any contem-

plated treatment, the formulation of the insecticide and the equipment and labour necessary for its application, the need for repetitive treatment, and the avoidance of effects of the treatment on the product or products in store and on the operators during the application. There now exists a very considerable, though still incomplete, body of knowledge about each of these factors and the final selection of the appropriate treatment is usually a job for a specialist. Not only is an extensive background knowledge of insects, insecticides, and applicators needed, but also considerable practical experience of insect control so that the treatment is made as straightforward as possible by anticipation of and allowance for any practical difficulties. Whatever the treatment or combination of treatments eventually chosen, there is one golden rule about the actual application—it must be thorough or the labour and cost of the treatment may be largely wasted. Too often failure of a treatment is blamed on anything but the lack of skill and thoroughness of the operators.

With the growth of knowledge it has become clear that generalisations about treatments are scarcely possible, too many situations having unique features. Advice must therefore often be sought, and it may be helpful to record the sources of information available to enquirers in the U.K. They include the following:

The *Pest Infestation Laboratory* is a Government research institute which devotes itself to research mainly on stored produce, and includes investigations of general storage problems, insect infestation, and methods for its prevention and control. Active interest is maintained in similar problems in British overseas territories. Enquiries should be addressed to the Pest Infestation Laboratory, London Road, Slough, Bucks.

The Ministry of Agriculture, Fisheries and Food, through its *Infestation Control Division* at Tolworth and regional offices, provides an inspectorate service whose main function is to prevent and control losses of stored produce from insect and rodent infestations. Enquiries should be addressed to the Infestation Control Division, Ministry of Agriculture, Fisheries and Food, Hook Rise, Tolworth, near Surbiton, Surrey. In Scotland, help may be sought from the Infestation Control, Department of Agriculture for Scotland, East Craigs, Edinburgh 12.

Sampling groundnuts for determination of insect infestation after storage in an experimental sacklet treated with insecticide.

The *British Museum* (*Natural History*) is particularly responsible for the correct identification of biological specimens. Enquiries should be sent to the British Museum (Natural History), South Kensington, London, S.W.7.

The *Public Health Officers* of Local Authorities deal with both insects and rodents, especially in relation to their effects on the quality of foodstuffs.

Help may also be obtained from the *technical staffs of certain firms* producing insecticidal preparations, or *firms offering a pest control service* may be consulted. Information on these may be obtained from the Industrial Pest Control Association, Cecil Chambers, 86, Strand, London, W.C.2.

In conclusion, it must be stressed that one of the main needs to help in reducing the heavy losses of foodstuffs in all parts of the world is wider education in the potentialities and uses of hygiene and insecticides, and in the most effective methods for their application. In spite of considerable gaps in our knowledge, there is already available far more information than is at present being fully made use of. There is no doubt that much greater benefits can come from wider use of the control measures already tried and proved. In the meantime, research workers will continue to strive for improvemeant of existing methods and for discovery of new ones.

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Fumigation with Ethylene Oxide

By G. Mayr and H. Kaemmerer*

The suitability of ethylene oxide for the cold sterilisation of foods was described in FOOD MANUFACTURE, April, 1957. In the following article the authors continue the story with specific reference to dried egg powder and gelatine, for which a mixture of ethylene oxide with other bactericidal gases is even more effective.

I. DRIED EGG POWDER

WHEN an egg is opened, the position of the parts is disturbed and the natural protection of the material against bacterial infection is destroyed. As in the case of other foodstuffs, the best method of avoiding deterioration is to extract all water and to convert the material to a dried powder. During storage, chemical and bacterial decomposition endanger the quality of the dried egg powder. Gradual oxidation of the fat and lecithin occurs and rancidity develops. A certain moisture content causes the lecithin to swell and form an excellent breeding ground for all kinds of germs. Deteriorating egg powder tastes bitter and irritates the throat; according to Koettsdorfer, the acid number increases to over 40.

Composition of egg powder

The average composition of dried egg powder is as follows:

water	5·0%
nitrogenous matter	34·7%
fat	53·6%
nitrogen-free matter	3·3%
ash	3·4%

Besides being very digestible, dried egg powder is very rich in the important proteins albumen and vitellin. The reason for this is its high contents of lysine, tryptophane, histidine, tyrosine and cystine. Vitellin is a nucleoalbumen having the following composition:

carbon	51·2%
hydrogen	7·2%
nitrogen	16·1%
sulphur	1·0%
phosphorus	1·0%
oxygen	23·6%

The amino-acids of which vitellin is composed are present to the extent shown in the following table, which also gives the corresponding figures for albumen:

amino-acid.	*vitellin.*	*albumen.*
alanine	0·8%	2·2%
valine	1·9%	2·5%
lysine	4·8%	3·8%
leucine	9·9%	10·7%
histidine	1·9%	1·7%
phenylalanine	2·6%	5·1%
tyrosine	3·4%	1·8%
proline	4·2%	3·6%
aspartic acid	2·2%	2·2%
glutamic acid	13·0%	9·1%
arginine	7·5%	4·9%

Dried egg powder also contains another protein, livetine, which has the following composition:

nitrogen	15·35%
phosphorus	0·05%
sulphur	1·08%
ash	0·60%

The fat of the egg yolk, the so-called egg yolk oil, of which 53·6% is present in the dried egg powder, usually consists of a yellow oil, which may be light or dark, coloured by the diluted egg colouring matter. About 5% of this is non-saponifiable and consists mainly of cholesterol. The residue consists of 90·6% fatty acids, a glycerol residue of 4·3% (corresponding to 10·3% glycerol) and 5·1% non-saponifiable matter. The following fatty acids are present:

myristic acid	2·1%
palmitic acid	29·3%
stearic acid	9·3%
oleic acid	34·6%
linoleic acid	10·1%
arachidic acid	0·07%

The substance called "egg lecithin" contained in the dried egg powder is a mixture of various phosphatides; it is soluble in alcohol, ether, chloroform, fatty oils and many other organic solvents. In water it first swells and then forms a streaky milky or colloidal solution (*myelin reaction*). Of the phosphatides, colamin-lecithin (cephalin) in particular is present, together with *alpha* and *beta*-lecithin. The substances show the following average composition:

carbon	64·63-68·13%
hydrogen	10·96-12·14%
nitrogen	1·37- 2·77%
phosphorus	3·22- 3·97%

The characteristic yellow colour of hens' eggs, lutein, is principally a mixture of xanthophyll and zeaxanthin, with traces of carotene and vitamin A.

Organisms causing infection

The most usual external organisms which cause infection of dried egg powder are those of the proteus group, mainly responsible for fast bacterial decomposition, and of the mesentericus group. Both these groups are antipathogenic, but recently cases have occurred of infection by pathogenic organisms, in particular the salmonella group. Until recently, "cold sterilisation" has been the only successful method of removing the danger of infection without altering the properties of the egg yolk; some experiments lately performed to test the suitability of ethylene oxide for disinfecting dried egg powder show promise, especially if a mixture of ethylene oxide with halogenated hydrocarbons or organic esters is used.[1, 2]

Test methods

In the experiments, organisms which were found in dried egg powder were isolated and cultivated. These included organisms of the proteus group such as *proteus vulgaris*, and also *clostridium sp.* In a series of experimental fumigations, a concentration of 750 g. of ethylene oxide per cu. m. with an exposure time of 6 hours was considered satisfactory. Sterilisation was checked by the method developed by Membranfilterwerke Sartorius A.G.

* Deutsche Gesellschaft für Schädlingsbekämpfung, Frankfurt/Main.

which allows continuous observation of the stages of disinfection.

Having established the suitability of ethylene oxide for fumigation, experiments were carried out to find out whether it would adversely affect the quality of the material fumigated. It was known that under certain circumstances, ethylene oxide has an unfavourable effect on proteins (Polysaccharide Laboratory Report No. 5613). To do this we used paper chromatography to determine the amino acids, using the method of C. E. Dent.[3] Schleicher and Schuell 2043b paper was used, the two diluting media being water-saturated phenol and butanol + glacial acetic acid + water in the ratio 4 : 1 : 5. For developing we used the well-proved ninhydrin spraying reagent and dried the developed chromatograms for 24 hours indoors, as in this way the coloured spots of the amino acids showed up better.[4]

Results

Evaluation of the chromatograms presented no difficulties and we succeeded in separating fairly clearly the individual amino acids. When comparing the chromatograms of the fumigated and non-fumigated specimens, we could find no difference in the type or position of the spots. The Rf values were found to be within the known limits, indicating that ethylene oxide causes no change in the structure of the egg white, which can also be deduced from the presence of the individual amino acids.

To complete the experiments we also investigated by paper chromatography the behaviour of the fatty acids to test whether any change in the product had taken place. We used the above mentioned filter paper which, however, had been acetylated prior to use to render it partly hydrophobic. As diluting media we used ethanol + concentrated ammonia + water in the ratio 80 : 4 : 16, and as a developer a 0·5% neutral red in phosphate buffer (pH = 7·2). We would like to point out that the spraying on of the developer and the subsequent drying must under all circumstances be carried out in an atmosphere free from acid and ammonia in order to achieve satisfactory results.

In general, the identification of the fatty acids by the determination of their Rf values was successful. A comparison of the chromatograms of fumigated and non-fumigated specimens showed no difference in the character of the fatty acids present.

After these experiments were completed, further tests were carried out and we found that a mixture of ethylene oxide with halogenated hydrocarbons and organic esters show an increased bactericidal efficiency, particularly against salmonella. This enabled us, for instance, when using a mixture of ethylene oxide and methyl bromide, to reduce the necessary concentration from 750 g. of ethylene oxide per cu. m. to 500 g. per cu. m. The results were even better if instead of methyl bromide, the ethyl ester of formic acid was used. In this case, and according to circumstances, the concentration can be reduced to 350 to 400 g. per cu. m. The use of ethyl formate or methyl formate has the advantage that the specific properties of the egg powder remain completely unchanged. This means that complete elimination of salmonella is achieved without causing any damage to the goods to be fumigated. In addition, the fumigation costs in individual cases can be considerably reduced.[6, 7]

II. GELATINE

Dry gelatine is an important ingredient in the manufacture of food mixtures. This material is liable to be highly infected with bacteria because of its processing method, the proteolytically acting *clostridiens* types being particularly prominent. Hygiene and preservation demand that this material be sufficiently sterilised.

As ethylene oxide is effectively bactericidal, it was natural to consider gaseous ethylene oxide for disinfecting dry gelatine. Up to now hardly any attempt has been made to study the disinfection of dry gelatine, and we had to discover the optimum conditions for disinfection. We report briefly on the procedure of these experiments and their results.

Test apparatus

The apparatus used for fumigation with ethylene oxide by the vacuum process consists of several vacuum desiccators used as fumigation containers, a vacuum pump and a sterile cotton wool filter. This apparatus is supplemented by evaporators for ethylene oxide and heating equipment for the fumigation containers. The functioning of the apparatus is identical with that of the Degesch-vacuum process.[5]

Results

Ethylene oxide alone was negative, but two mixtures proved useful, ethylene oxide + propylene oxide, and ethylene oxide + methyl bromide. From a series of experiments we concluded that a mixture of ethylene oxide + methyl bromide, with a concentration of 1,000 g. per cu. m. and an exposure time of 6 hours at optimum temperature and moisture conditions (25-30°C., 55-70% R.H.) (77-86°F.) would fully justify our expectations regarding a practicable sterilisation process. A bacteriological institute working on fumigated dry gelatine independently of us, confirmed our views on the usefulness of the method described and at the same time justified the material and time spent.

A detailed report on the working mechanism of sterilisation with ethylene oxide, and with mixtures of ethylene oxide and other substances, is being prepared.

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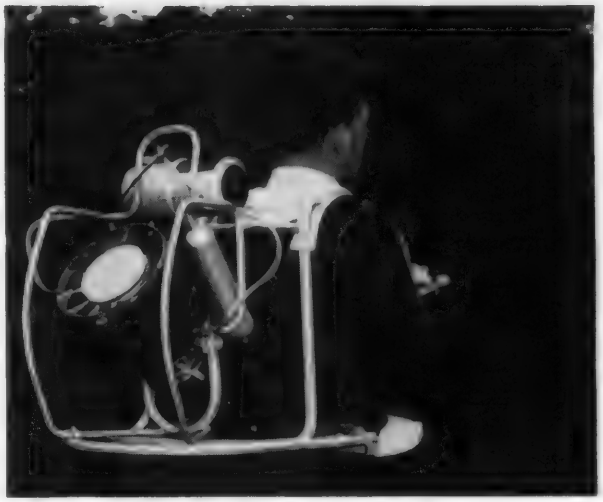
Protection against Pests

FOOD MANUFACTURE surveys equipment and materials

Pests cost money. Here are some ideas for destroying them and cutting costs.



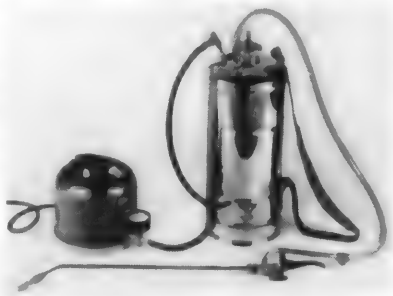
The Micronette lightweight concentrate sprayer.

SOME important methods of protection against pests are the spraying and dusting of growing crops, the spraying of the interiors of warehouses, sheds and barns, the treatment and impregnation of the surfaces of food containers and of factory walls and beams, as well as the dosing of stored food with pesticides and fumigants.

Spraying and dusting

Micron Sprayers, Ltd., manufacture a range of spraying equipment for applying insecticides and fungicides to crops such as fruit, coffee, cocoa, rice, tea, bananas and maize. Their machines are designed for ultra-low volume application; the spray is broken into very fine droplets by a rotary atomiser and carried on to the target in a broad and powerful stream of air. It is claimed that because of the wide beam, an extremely even deposit is made over all surfaces of the foliage, and that the leaves nearest the spray are not overdosed. The swirling action provides a good cover on upper and lower leaf surfaces. For most spraying purposes a droplet size of 80 microns is produced. Three machines are produced by this firm: the *Micron Twin*, which is mounted on the 3-point linkage of a tractor and driven by the tractor's power-take-off; the twin automatic outlets are fully adjustable for double-sided spraying of trees, bushes, etc., and for the single-sided spraying of big trees, the twin fans each produce 200 cu. ft. of air per min.; the *Micron Meg*, which is a tractor-mounted sprayer working on the same principle as the *Micron Twin* but with its own independent engine; and the *Micronette* (illustrated), a lightweight sprayer available as a trolley or shoulder mounted unit; it is powered by a 34 c.c. J.A.P. engine and is simple to maintain and operate.

The Kestrel knapsack sprayer has a polythene container and weighs 8½ lb.



Bulk liquid spraying unit type CFM/100/G/T made by Gennar Engineering, Ltd.

The *Knapsack Sprayer* manufactured by the Kestrel Engineering Co., Ltd., incorporates a polythene container of 2, 3, or 5 gal. capacity, and a diaphragm pump and filter giving a working pressure of 65 p.s.i., mounted in a tubular steel frame and fitted with shoulder straps and waist belt. A 24 in. lever operated lance is supplied with the machine. The makers claim the following advantages over the old type metal sprayer: extreme lightness (the complete outfit weighs only 8½ lb.; the polythene container is resistant to all chemicals likely to be used; great strength; the pump diaphragm valves and lance, being polythene lined, are chemical resistant, and no rubber comes into contact with the spray chemicals at any point. A constant pressure control valve will regulate the pressure at the jet from 5 to 60 p.s.i. Included in the range of lance extensions and accessories are telescopic lances made from dural, polythene lined, a cross-boom mounted on wheels, and a non-drift spray shield for applying weed killer between rows.

Among the wide range of spraying and dusting equipment made by Cooper, Pegler and Co., Ltd., which is suitable for the protection of stored products, are the *Eclair* knapsack machine, the *Leo-Colibri*, which is supplied either as a knapsack machine or as a two-wheeled trolley mounted machine, the *Falcon*, a lightweight pneumatic sprayer, the *Fog*, a high-pressure piston-operated hand sprayer, and the *Ondiver* high-pressure sprayer which can be supplied in two sizes with an 11 gal. or 22 gal. tank.

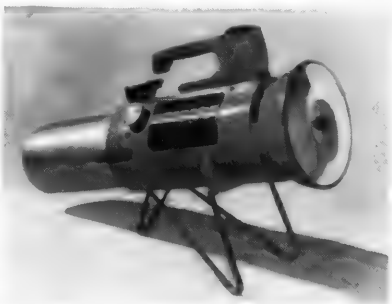
The liquid spraying unit type CFM/100/G/T made by Gennar Engineering, Ltd., is designed to spray up to 2 gal. of insecticide, weed killer, creosote, etc., from one charge of compressed air. It consists of a compressor fitted with 160 p.s.i. pressure gauge, 3 ft. of air hose and lever-locking tyre connector, and a 2 gal. lacquered brass liquid container fitted with 42 in. of p.v.c. hose, shoulder strap, 18 in. bent lance, and adjustable jet giving any degree of spray. For use, the tank is four-fifths filled with liquid to be sprayed and the compressor connected to the tank, which is then charged to 80 p.s.i. The compressor is then disconnected and the tank is ready for use. Other equipment made by the same firm are a portable liquid pump-fed spraying unit type PS/20, designed to spray low and medium viscosity liquids direct from their bulk containers, and the *Foggit* atomiser unit type CFM/100/G/F designed for the portable and intermittent application of activated vapours in open or confined spaces.

Kiekens - Whirlwind (London), Ltd., supply a range of spraying machines for field work, among which is the *Wing-2*, designed for orchards, hops and soft fruit. It has a 320 c.c. 2-stroke engine driving a 2,500 cu. ft. per min. fan and self-priming centrifugal pump. Tank capacity is 100 gal. and there are 8 separately adjustable spray outlets with polythene nozzles. Width is 3 ft. 7 in.

Aerosol dispensing

Microsol mechanical fog generators made by Silver Creek Precision Corporation are available in four models, 202, 202 Special, 303T (all electrically driven), and 304 with petrol engine. Designed mainly to use insecticides based on pyrethrum and malathion, they produce aerosols of particle size between 5 and 150 microns according to requirements. The airborne insecticide is then distributed by turbulent air currents. The model 202 is 19 in. long, 6 in. diameter, and has a capacity of 3¾ pints. It is driven by a ¼ h.p. AC/DC motor, in voltages to order. The output is 0·4 gal. per hr.

Baskets of carrots after storage. The left-hand basket was treated with Cunilate fungicide; the untreated basket on the right shows fungal growth.



Mechanical fog generating equipment for dispersing aerosol insecticides in food stores, warehouses, ships' holds, etc., made by Silver Creek Precision Corpn. (*Above*): The Microsol 202. (*Below*): The Microsol 303T.

Fungicidal wood seal

Developed in the U.S.A. just after the last war, *Cunilate* wood seal, the effective constituent of which is a soluble form of copper-8-quinolinolate, is manufactured and supplied in this country by Cuprinol, Ltd., and is designed for the treatment of containers and materials used by food growers and packers, and by container manufacturers. Advantages claimed for *Cunilate* are non-toxicity, economy in use, ease of application, non-tainting by odour or flavour, and permanency. Incorporated are water repellent constituents which are said to maintain their full effectiveness after washing and steaming. *Cunilate* is also suitable for incorporation in fungicidal paints to provide sanitary surfaces. In the U.S.A. its use has been approved by a number of authorities in connection with food. Various grades are available for different purposes.

Insecticides and rodenticides

Ratsouris, Ltd., provide materials and undertake service for the destruction of insect pests; they supply both rodenticides and insecticides. Among the latter, the products having greatest application are *RIS Emulsion* concentrate and *RIS Dispersible* powder, both containing gammexane, which require dilution with water before use. The makers recommend that the diluted spray be applied to the structure of infested buildings twice a year to destroy weevils, flour beetles, spider beetles, moths, etc. Similar concentrates based on malathion have recently been developed. For the direct treatment of food, the firm supplies *RIS* Pyrethrum/PB spray, which is a pyrethrum spray synergised by piperonyl butoxide. For destruction of rats and mice, the same firm supplies *RIS Warfarin 5* (containing 0·025% *Warfarin*) which is a ready for use bait claimed to be the least toxic of such preparations.

Advances in Food Technology

FRUIT SQUASH

Stability of Vitamin C

The author investigated the loss of vitamin C in a fruit squash under normal storage conditions and in laboratory experiments. The fruit squash consisted of orange juice, diluted from a six-fold concentration of natural juice, to which had been added 26% of sucrose, 1·5% of citric acid, and oil of orange. The *p*H was 2·5. The squash was pasteurised in bulk and distributed in a number of small bottles. It contained 250 mg. per litre of sulphur dioxide as preservative. Vitamin C was estimated by titration with 2·6 - dichlorophenol - indophenol, after adding acetone.

In the storage tests there was little or no loss in 9 months, and a retention of 50-60% of the original amount, assumed to be 57 mg. per 100 c.c.s, after 18 months. In the laboratory experiments, no difference was found in the rates of deterioration at 0°C. and at room temperature, but loss was rapid at 37°C. Exposure to light had no effect, but the presence of air caused rapid destruction. Unexplained variations between the contents of bottles filled with the fruit squash from the same batch, and apparently stored under identical conditions, are discussed.—A. E. Bender, *J. Sci. Food Agric.*, 1958, **9** (11), 754.

CANNING

Procedures with Fish

Sections of salmon, from which the heads and visceræ have been removed, are usually exhausted in the cans at 212°F. for 15-20 min., and then processed at 240°F. for 60-90 min. at 10 lb. steam pressure.

In California, sardines are cleaned, steamed, and dried for an hour or two in tunnels at 110°F. They are then brined and packed in hot cottonseed oil. These operations must all be carried out within 12 hr. of the arrival of the fishing vessel.

Caviar, originally made from the roe of the sturgeon, is now prepared from the roes of many other fish, including salmon. The roe of the female fish is rubbed gently over 16-20 mesh sieves, which separate the eggs into a wooden tub beneath. About 4½% of salt is added and the whole is gently mixed until a brine slime appears. After standing for a short time, mixing is continued until the eggs have become glass-like. The eggs are then drained and packed, with separation of light and dark varieties, in barrels or tubs. The latter are refrigerated and sent to the canneries. There the eggs are packed in glass or metal containers, exhausted at 212°F., and processed at 240°F. in No. 2 cans.

Also described are the methods of manufacture of chowder and of cod-fish cakes.—E. Hardy, *Canning and Packing*, 1959, **29** (337), 10.

MILK PRODUCTION

Bovine Metabolism

Bovine metabolism, with special reference to milk production, and examples of variations in milk composition, not all of them due to dietary changes, are reviewed by the author.

It has recently been discovered that one of the milk proteins, β-lactoglobulin is not always the same from one cow to another. Some animals synthesise two components, β-lactoglobulin A and B, while others produce either A or B alone.

The synthesis of milk fats in the udder is being studied, using substances containing radioactive isotopes. The milk fat is derived from two sources, the first being lower fatty acids derived from acetates in the blood, which, in turn, have their origin in bacterial action in the rumen. The second source consists of blood lipids, neutral fat, etc. If the percentage of fat falls below 3%, as may happen when cattle begin to graze in the spring on rapidly growing herbage, or when a diet is deficient in roughage, the fall can be corrected by administering sodium acetate or by the addition of hay or other fibrous material to the food. In both cases more acetates become available for the synthesis of the milk fat.

A spring diet of rapidly growing grass is attended by another danger, that of "grass tetany," preceded by hypomagnesæmia. Grass tetany is now known to be due to magnesium deficiency, the affected cattle being unable to assimilate and utilise magnesium compounds at the normal rate. The addition of magnesium oxide, with food concentrates, to the diet, is beneficial. It appears that some substance, at present unknown, present in young herbage, has an inhibitory action on magnesium metabolism, on which the effect of potassium and nitrogen, derived from fertilisers, is discussed.

The author is of the opinion that the chemical quality of milk in England and Wales has deteriorated since the early 1930's.—H. D. Kay, *Chem. and Industry*, 1959 (1), 3.

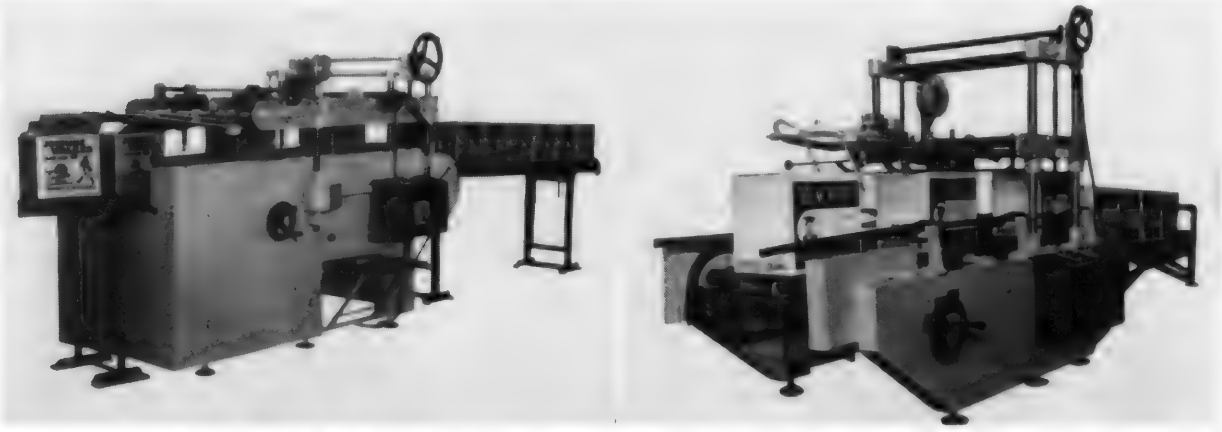
WHALE MEAT

Use in Sausages

Whale meat can be used for a number of meat products and sausage types. In Germany, the only whale meat imported is that of Norwegian dwarf whales which is imported in deep-frozen condition. It is wrapped in cellophane packings and hygienically unobjectionable. The price of whale meat is considerably lower than that of slaughter animals.

Compared with beef, whale meat has a coarser appearance and coarser fibres; after cooking and boiling, it is drier but also more tender than beef. When used for Frankfurter type sausages, it is not quite as water-absorbing as beef. After thawing, its *p*H value is in the range from 5·6 to 6·4. It has a slight but distinctly noticeable natural flavour which can be masked by preparation with various spices and extracts. Fish oil taste and odour will only occur if the meat is unsuitably stored or processed. Cold storage must be consistently maintained up to the moment of manufacture. Exposure to air should be avoided if possible. Distinct identification of whale meat products is necessary. Histological detection of deep frozen whale meat is possible even in mixtures with other meat.—O. Roemmele, "*Die Fleischwirtschaft*," 1958, **10**, 833.

Machinery and Equipment



Two carton taping machines made by Gosheron and Co., Ltd. *(Left):* **The Musketeer Mk. 3 accepts cartons with pre-stitched bottoms and glues and tapes the top flaps.** *(Right):* **The Musketeer Mk. 1 is a taping unit only.**

CARTON SEALING MACHINERY

John Gosheron and Co., Ltd., have introduced the *Three Musketeers*, three carton taping machines.

The *Musketeer Mk. 1*, size 7 ft. 6 in. × 4 ft., was the first to be developed. This is a taping unit only. Filled cartons with the top and bottom flaps already closed are presented to the taping mechanism. This mechanism applies a shallow "U" seal of thin vinyl printed self-adhesive tape to the top and bottom of the carton whilst it is under compression thus assuring a tight, compact pack.

The electrostatic properties of the vinyl tape are employed to keep the tape against the steel applying pads so that it is always in position ready for application to the next carton. The tape is severed after each operation by a hot-wire cutting device to ensure a clean, straight edge and a perfect seal. Adjustments for variations in carton height and width can be made in less than a minute by two hand-operated wheels.

The *Musketeer Mk. 2*, size 14 ft. 4 in. × 4 ft. 3 in., incorporates a flap gluing attachment. The filled cartons, with flaps ungummed, are presented to the gluing unit, whilst the contents of the carton are supported by a special conveyor plate. The flaps are coated with glue by rollers and then the carton is securely closed. The taping unit performs the final sealing operation with printed, vinyl self-adhesive tape.

The *Musketeer Mk. 3*, size 8 ft. 4 in. × 4 ft. 3 in., has been specially designed for use where space is an all-important factor. It combines a gluing and taping unit in very small dimensions.

The TEC electric precision thermometer supplied by Sierex, Ltd., can be used for testing or for routine process temperature measurement, and has accessories which permit an air-tight introduction of feelers through oven or autoclave wall.

ELECTRIC THERMOMETER

Developed from an instrument designed for medical use, the Electric Precision Thermometer Type TEC, supplied by Sierex, Ltd., is intended for the food industry. It consists of a battery-operated galvanometer sensitive to ±0·3% scale reading, which is calibrated directly in °C.; without extra charge a Fahrenheit scale can be added. Temperature measurement is by means of four thermocouple applicators on extended leads which plug into the side of the galvanometer case; readings of each are taken by means of a four-position switch. A junction box with press switches is available to allow the use of up to 15 applicators with the one instrument. For measuring the temperature at various points inside an oven or autoclave, a gland is provided for mounting in the wall of the vessel; gas tightness is ensured by a heat-resistant silicone rubber plug through which the leads pass.

A special gland is available for introducing an applicator into the contents of tins, etc., and a cutting tool is provided for perforating the tin to insert the gland. Special needle applicators for measuring in sausages, etc., are available at extra charge. The instrument has automatic temperature compensation for variations from 0 to 35°C., and although the normal range is 0-130°C., other ranges are available. The price, complete with four packing glands, cutting tool, spanner, and four applicators, is £135; the makers say that delivery does not exceed six weeks.

TRUCK

The *Packflat* truck, designed and manufactured by Packman Machinery, Ltd., is said to be able to carry loads of well over 1 cwt.—yet it can be folded into a unit only 4 in. thick.

The truck is of light steel and canvas construction. It is closed by laying the truck down, with the handles on the ground, and releasing an end flap which is folded flat against a canvas base. A simple lock screw is released, and as each handle is in turn swung to the "closed" position, the sides "collapse" and lie flat against the base. With the lock-screw secured once again, the truck is ready for storage.

WHETSTONE

A grinding machine which presents a flat grinding surface throughout the length of the stone is being marketed by A. E. Higginbottom Co., Ltd.

Powered by a ¼ h.p. motor, the machine, called the *Sharpenset*, directs a constant stream of water on to the working surface of the stone and lubricates and cools the blade, ensuring, it is claimed, that there is no dust. The water is returned to the bath in a continuous operation so that the addition of only a little water to the bath is occasionally necessary. The stone is set at a predetermined angle of 7½°.

The motor is reversible and the whole machine weighs 36 lb.

POWER SHIFT TRANSMISSION

Hyster Co. have announced that a new two-speed, power shifted *Hystamatic* transmission is available as an optional equipment for the new Challenger 60, 70, and 80 pneumatic-tyre lift trucks in the 6,000-8,000 lb. capacity range.

The new transmission is a hydraulically shifted, constant mesh unit with integral torque converter. The two-speed ranges forward and two in reverse are operator selected by means of levers. All components are confined in a single housing mounted to the engine as an integral part of the power train.

POLYTHENE CONTAINER

The latest addition to the range of polythene containers marketed by Tool Treatments (Chemicals), Ltd., is a 50 gal. container. It is the latest addition to the *Black Knight* range of plastic products marketed by the firm.

The container is cast in heavy gauge polythene. It is rigid and will resist distortion even when full to capacity.

The containers are available in flexible polythene or in rigid sterilisable polythene at a slightly higher price. The latter type have a softening point of 116°C., a melting point of 130°C. and a low temperature brittle point of minus 70°C. Dimensions are 34 in. deep × 24 in. top diameter × 22 in. base diameter.

The containers are impervious to corrosion by acids or general chemical action and are said to be ideal for liquid storage for many industries.

The makers, A. E. Higginbottom Co., Ltd., say that the Sharpenset presents a flat grinding surface throughout the length of the stone.

The Packflat truck made by Packman Machinery Co., Ltd., carries over 1 cwt. yet when folded is only 4 in. thick.

OIL-RESISTANT BELTING

A new type of conveyor belting which resists the action of grease, oils and lubricants as well as heat, is now being made by David Moseley and Sons, Ltd., using *Hycar* synthetic rubber.

This type of belting is invaluable for the conveyance of greasy foods such as chocolates and biscuits, and vegetable oil products.

The belting—which is non-toxic—is built up of five plies of cotton duck laminated together, and faced with Hycar oil-resistant synthetic rubber made by British Geon, Ltd.

DUCTED ALUMINIUM SHEETING

Solid aluminium sheeting which has an internal system of passages and ducts is being made by the Northern Aluminium Co., Ltd.

The new product, known as *Noralduct*, is said to be particularly suitable for heat transfer equipment and, as the integral passages can follow almost any continuous pattern that can be drawn on paper, there are many other possibilities.

Sheets of *Noralduct* can be formed after manufacture, as are those used in refrigerator evaporator components, for example. Either a plain or an impressed pattern finish is available, and colour can be included in the product design as there are no welds to spoil the appearance of an anodised finish.

SERVICE ELEVATOR

A new service elevator has been introduced by Barron and Shepherd, Ltd., who state that one of the main features of the new piece of equipment is its simplicity of installation.

The elevator is designed for floor to floor handling of up to 2 cwt. loads. It is powered by a geared motor with a magnetic brake, driving through chain and sprockets. Push button control is installed at every level.

The machine may be installed as a complete unit or with mast, cage and motor unit sub-assemblies. The height of the lift and the size of the cage are made according to requirements.

MECHANICAL BEAN HARVESTER

In the past it has been difficult to persuade the grower to produce a bean crop for the canner because of the problem of labour for picking. The problem may be overcome, it is claimed, by making use of the *CRCO* mechanical bean harvester made by Chisholm-Ryder Co. Inc. The machine is marketed in this country by Mitchell Engineering, Ltd.

The harvester picks two rows at a time, planted 36 to 38 in. apart. Two pairs of gathering units are located inside and just in front of the tractor wheels to lift and guide the plants to a position where they come into contact with the revolving spring steel fingers of the picking reels. These fingers strip off all the beans and most of the foliage, leaving the plants in the ground. The foliage and beans are deposited on a 20 in. wide conveyor belt, between the reels, and discharged on to a rodded shaker screen. Here the leaves and other light debris are separated from the beans by a suction-type centrifugal fan. The beans are then discharged to either a double-bagging or a palletising outlet.

News Digest

Corrosion Exhibition promises to be best yet

At a press reception held at Leonard Hill House, London, on February 23, it was announced that the 1959 Corrosion Exhibition will be 50% bigger than the 1957 exhibition.

Nearly 80 firms are showing a wide range of materials, processes, and services for the defeat of corrosion. All the best-known firms in the anti-corrosion industry are exhibiting, and the show promises to be the best of its kind ever held.

The National Chemical Laboratory will be exhibiting, and it will feature the work of its Corrosion of Metals Group. Among research advances to be shown will be a means of estimating the corrosiveness of water.

Among the guests at the reception was Sir Owen Wansbrough-Jones, K.B.E., C.B., Chief Scientist of the Ministry of Supply. Sir Owen will officially open the Exhibition at 11.30 a.m. on Monday, April 27. It will continue until Thursday, April 30. The venue is the Royal Horticultural Society's New Hall, Greycoat Street, Westminster, S.W.1.

Write for complimentary tickets to the Exhibition Organiser, "Corrosion Technology," Leonard Hill House, Eden Street, London, N.W.1.

Soft drinks report

The report of the Food Standards Committee examines the need for control over the composition, labelling, and advertising of soft drinks, and contains proposals for revision of the Food Standards (Soft Drinks) Order, 1953. It is said to take account of evidence received from the soft drinks industry and other interests, including those concerned with the enforcement of food and drugs legislation.

The report is submitted to the Minister of Agriculture, Fisheries and Food, the Minister of Health, the Secretary of State for Scotland, and, as respects Northern Ireland, the Secretary of State for the Home Department. If interested parties have any views on the recommendations which they would like considered before any decisions are taken by Ministers, they should address them to the Assistant Secretary, Food Standards, Hygiene and Slaughterhouse Policy Division, Ministry of Agriculture, Fisheries, and Food, Great Westminster House, Horseferry Road, London, S.W.1, to arrive not later than May 8, 1959; that Ministry will co-ordinate representations from all parts of the United Kingdom. Copies of the report may be obtained from H.M. Stationery Office, York House, Kingsway, London, W.C.2, or from any bookseller, price 1s. plus postage.

Milk and dairies regulations

The new Milk and Dairies (General) Regulations, 1959, which came into operation on March 8, 1959, bring the earlier regulations into line with modern methods of milk production. They simplify much of the existing procedure, making it easier for milk to be produced, handled, and distributed under up-to-date hygienic conditions. Amongst the new provisions are ones requiring persons to wear clean and washable overalls and head covering, when engaged in milking cows or in handling milk in open containers; to keep open cuts and abrasions covered with a waterproof dressing; and to refrain from spitting and the use of tobacco.

Writing a book?

The Leonard Hill Technical Group, publishers of FOOD MANUFACTURE invite the submission of manuscripts of books to be considered for publication. All manuscripts will be promptly acknowledged and carefully considered by qualified experts. A synopsis with chapter headings should be sent in the first instance to:

The Manager,
Leonard Hill (Books) Ltd.,
Leonard Hill House,
Eden Street,
London, N.W.1.

Leonard Hill are specialists in industrial, technical and scientific books. They have a reputation for vigorous and successful promotion of their books by extensive advertising and maintain a world-wide selling and distributing organisation.

Railway transport container

A double load is claimed to have been made possible by a specially designed refrigerated container for transporting frozen foods now operating on British Railways, Eastern Region, for Birds Eye Foods, Ltd.

The container, the first of a fleet of 100 which will eventually be in use on British Railways all over the country, has been designed by a joint team of Birds Eye and railway experts together with Richard Lonsdale-Hands. They are being constructed by the Swindon Locomotive Works of the British Transport Commission, and it is anticipated that construction will be completed in time for handling the peak outloading during the 1959 pea season.

Seventy-six will be painted in Birds Eye livery of royal blue, white, and silver, and the remainder in the railway colours.

The new containers, which will be operated in circuit working between Birds Eye factories at Great Yarmouth and Lowestoft and various destinations, are designed to carry four complete pallet loads of quick-frozen foods, with a maximum load of one ton per pallet. Each is fitted with two dry ice bunkers, each capable of holding four standard I.C.I. 25 lb. sq. blocks, sufficient to maintain an internal temperature of 0°F. in an ambient of 70°F. during a 24 hr. transit. Extra ice can be added to the container to cope with ambient temperatures in excess of this. It is an open CO_2 system.

The increased payload has been made possible by modifying the standard railway conflat in such a way as to allow two containers to ride together, thus doubling the amount of food that can be carried on each train.

Nylon protective clothing

Recent developments in nylon overalls and protective clothing, including several which are of special interest for men's wear, make one of the main features of the display by British Nylon Spinners, Ltd., at this year's Factory Equipment Exhibition at Earl's Court, April 7-17.

Following the widespread success of 4 oz. plain weave continuous filament nylon fabric, particularly for women's overalls, new and extremely promising nylon fabrics are beginning to appear. Among the garments being shown at the exhibition are some made from lightweight proofed nylon fabrics. There is also a display of industrial gloves made from new nylon fabrics.

NEWS FOR IMPORTERS

Imports of sugar.—Arrangements for the import of raw and refined sugar during 1959 will be broadly the same as those for 1958.

Imports from countries participating in the International Sugar Agreement will continue to be admitted without limitation on quantity under Open Individual Licences. Sugar from non-participating countries is subject to quota.

Licences will be valid until December 31, 1959.

Details are given in Notice to Importers No. 895 issued by the Import Licensing Branch of the Board of Trade.

Export licensing control.—The Board of Trade have announced certain changes in export licensing control which will substantially reduce the range of goods requiring licence. Effect is given to these changes in the Export of Goods (Control) Order, 1959. The changes result from amendments to the list of goods subject to an embargo on exports to the Soviet bloc and China and from the further measures announced for the freer convertibility of sterling and certain European currencies.

Export control is removed entirely from the following goods: animal feeding stuffs; and grain and grain products.

Drawback of import duty.—The Board of Trade are considering an application for drawback of duty in respect of imported pasteurised spray-dried hen egg yolk when used for the manufacture of doughnut mixes for export.

Anti-dumping duty.—The Board of Trade have decided that a case has not been made out for the imposition under the Customs (Dumping and Subsidies) Act, 1957, of an anti-dumping duty on maize and milo starch imported from the Netherlands.

Factory extension

Associated Metal Works (Glasgow), Ltd., are having another extension to their works constructed. Full production is expected within a month or so.

Mould-resistant paint

A new paint, described as a water-bound chemical preparation that is ideal for use on walls and ceilings where there is liable to be mould growth and humidity, is being sold by Farrow and Jackson, Ltd.

The paint, called *Mercian Wallpaint*, is applied with a coarse-nozzled spray gun or a soft brush and provides a porous coating which, it is claimed, stays clean, dry, and free from moulds for long periods. It is also said to be able to absorb a certain amount of atmospheric moisture. It is non-inflammable, non-toxic, and odourless.

The loading bay for Birds Eye products at the new depot situated 2½ miles south of Reading, on the Basingstoke road. The warehouse is owned by S.P.D., Ltd., the distribution associate of Unilever, Ltd. The Birds Eye cold store which adjoins the north-east corner of the warehouse has a capacity of 150 tons.

Consulting scientists

A new organisation, known as the Association of Consulting Scientists, has been formed with the intention of operating in close collaboration with the Royal Institute of Chemistry and other professional institutes and organisations concerned with the co-ordination of British efforts in research, production, and marketing. The committee is as follows: chairman, J. G. Davis, PH.D., D.SC., F.R.I.C., M.I.BIOL.; hon. treasurer, G. W. Ferguson, B.SC., PH.D., F.R.I.C.; hon. secretary, W. H. Stevens, A.R.C.S., F.R.I.C., F.P.I., F.I.R.I.

Scottish quick-freezing plant

The Herring Industry Board say that arrangements now nearing completion will make their factory at Lerwick, Shetland Islands, the largest quick-freezing plant north of the Border. It will also be the largest unit in Great Britain devoted solely to the quick-freezing of fish. The installation of additional equipment, the need for which was foreseen and provided for in 1956, will add two-thirds to the processing capacity of the factory and is expected to be completed before the start of the Shetland herring season. Since 1956 both the herring and white fish catches of the growing Shetland fleet have increased appreciably.

At Stornoway, the Board are to increase the processing capacity of their factory by one-third this spring and again by one-third before the summer of 1960. Work has just been completed on a new cold-store which will treble the factory's previous holding capacity.

The Board also plan to construct a full-scale quick-freezing factory and cold-store at Mallaig, satisfactory results having been achieved with a pilot scale plant set up last summer. Work on the project will begin as soon as the financial and technical details are settled.

New factory

Mac Fisheries, Ltd., have received permission from Aberdeenshire Planning Committee to erect a new fish processing department and a loading bay at Park Street, Fraserburgh, and to extend the engine room there. The new department will employ 80-90 people.

Restrictive practices

The case for the Incorporated National Association of British and Irish Millers, the South-eastern Group of Millers, North-eastern Group of Millers, and the Scottish Flour Millers' Association is to be heard by the Restrictive Practices Court sometime on or after May 26 of this year.

Frozen foods exhibition

The Frozen Foods and Equipment Exhibition will be held at Blackpool from September 8-15, 1959. The exhibition will be held in two pavilions made of framed tenting with aluminium strutting which will be erected for the occasion. One of the pavilions will hold a display of frozen foods while the other will be devoted to machinery and equipment.

The exhibition is being organised by Anglo-European Exhibitions, Ltd.

New price schedule

The latest price schedule of the Steel Company of Wales, Ltd., announces increased allowances for tinplate substances lighter than 108 lb. The schedule states that there is an additional allowance for those who use substances in the 75/85 lb. range.

The schedule claims that for the first time a British strip mill tinplate price schedule includes the price of 65 and 60 lb. substances.

OBITER DICTA

● The roast beef of medieval England, according to some authorities, was all too often a superannuated plough ox which a few pence worth of grass had made fit for the butcher.—*The Times.*

● The British Spaghetti Queen, who won the spaghetti eating competition at last year's Soho Fair, will make a personal appearance in a costume made entirely of spaghetti.—*Press Release.*

● An American friend, a distinguished legal historian, recently arrived in this country, tasted a glass of Burgundy at dinner, shivered and said: "Brrrh! Room temperature!" —*Letter in The Times.*

● "It is conservatively estimated that Americans will consume . . . 400,000,000 tons of pickles." This figures out to an average daily consumption of 75 lb. in my household of six people. I don't think that we can keep this up day after day. —*Letter in D. and O. News.*

● A party of 5 Cambridge undergraduates and two Spanish scientists (all male) are to make a zoological and botanical survey this summer on Annabon Island in the Gulf of Guinea off French Equatorial Africa. As part of their necessary equipment they have taken with them 36 bottles of Yorkshire Relish. —*Press Release.*

● Pigs travelling over the Northern Pacific Railway now arrive at the packing houses without suffering any inconveniences *en route.* This has been made possible by the construction of a fleet of 200 "pig palaces," livestock cars equipped with aluminium shutters, which can be adjusted to stop cold winds from coming in the slatted sides of the car.—*Aluminium News.*

● Dr. Irvine Grote even has a sample of a Chinese cordial which contains the corpse of a poisonous snake. This proves that the Chinese are smarter than we are because they see the snake before they drink the stuff; therefore when later on they see other snakes, as we often do, they don't get alarmed or froth at the mouth; they know they are not real.—*Drug and Cosmetic Industry.*

PEOPLE

Prof. R. G. Baskett

PROF. RONALD GILBERT BASKETT, O.B.E., M.SC., F.R.I.C., has been appointed Director of the National Institute for Research in Dairying, University of Reading, from August 1.

Prof. Baskett is at present Professor of Agricultural Chemistry, The Queen's University of Belfast, and Head of the Chemical and Animal Nutrition Division of the Ministry of Agriculture for Northern Ireland. He was born in 1901, and educated at King Edward VI Grammar School, Chelmsford, and University College, Reading.

▪

MAJOR S. C. MILES, J.P., has been re-elected to the council of the British Baking Industries Research Association.

▪

MR. D. DOWNEY and MR. J. W. C. HARDS have been appointed technical representatives by Viskase, Ltd. Mr. Downey will work in the north-west and Mr. Hards in the south of England.

▪

MR. J. M. M. WINKELMAN has been appointed as sales and technical representative for grey iron castings in London and the Home Counties by Alfred Ellison, Ltd.

▪

MR. H. G. STAGE and MR. F. TOMPKINS have been appointed directors of Nu-Swift, Ltd. Mr. Stage has been oversea marketing manager since 1952; Mr. Tompkins has been home sales manager since 1954.

▪

MR. E. W. M. FAWCETT, technical director, and MR. H. P. P. HODGKINS, commercial director of Howards of Ilford, Ltd., have been appointed to the board of the parent company, Howards and Sons, Ltd.

▪

The Export Credits Guarantee Department has announced that on the retirement of MR. E. H. OSBORNE, MR. C. P. RAWLINGS has been appointed director of its Overseas Division. MR. R. A. DICKINSON replaces Mr. Rawlings as director of E.C.G.D.'s General Division.

MR. R. A. LE PAGE, M.A., has been appointed managing director of Mancuna Engineering, Ltd.

▪

MR. GEORGE WARWICK SMITH, formerly first assistant secretary in the Department of Trade, Canberra, has been appointed special commercial adviser in the U.K.

▪

MR. ALEXANDER MACNAIR has been made a director of William Macdonald and Sons (Biscuits), Ltd. He has for many years held the position of transport manager.

▪

MR. WALLACE V. SMEDLEY, head of the Smedley group of canning and quick-freezing companies, has been presented with an inscribed silver salver in recognition of his work as chairman of the Fruit and Vegetable Canners' Association. During his term of office a code of practice was drafted by the association.

▪

MR. P. M. MARLOW has been appointed a director of Baker Perkins (Exports), Ltd. For the last three years he has been based in London and has managed the company's sales organisation in Africa, India, the Far East, and Australia.

Until 1956 Mr. Marlow was manager of the company's Indian branch.

▪

MR. J. CHRISTOPHER CADBURY has been made a director of William Evans and Co. (Hereford and Devon), Ltd. He is a council member of the Food Manufacturers' Federation, a member of the Camden Research Station Management Committee and serves on the Jam Panel of the F.M.F. Until recently he was chairman of British Canners, Ltd.

▪

MR. E. A. FLACK, late of W. J. Bush and Co., Ltd., has now joined the London sales organisation of Jacobson Van Den Berg and Co. (U.K.), Ltd., as sales manager. He will control the sales of compounds and essences manufactured by their principals, Esrolko, Ltd., of Dubendorf, Zurich, and Aktieselskabet Grindstedvaerket of Aarhus, Denmark.

Obituary

MR. JOHN HERBERT HUGON, chairman and joint managing director of Hugon and Co., Ltd., died on February 11. He was 72. Mr. Hugon, who had been associated with the company for nearly 50 years, succeeded his father, the late Mr. G. R. Hugon, founder of the business.

Mr. M. A. A. Hugon, joint managing director, has been elected chairman and managing director in succession.

New offices

The London offices and showrooms of the Windsor group of companies are now at 76, Jermyn Street, S.W.1. Tel.: WHItehall 0411.

The Windsor group includes R. H. Windsor, Ltd., and Klaxon, Ltd.

British Cellophane factory

Production of *Cellophane* cellulose film has started at British Cellophane Ltd.'s new £3,000,000 factory at Sandscale, Park Road, Barrow-in-Furness, Lancashire. Parts of the plant are in operation, and the factory soon will be in full production. About 300 people will be employed.

The new factory is claimed to be the most up-to-date plant in the world for producing cellulose film.

Nestlé headquarters

The new Nestlé headquarters, St. George's House, London, E.C.2, was officially declared open recently by the Lord Mayor, Sir Harold Gillett.

The main building is seven storeys high with a further tower four storeys high, giving 98,000 sq. ft. of floor space. On the ground floor is the purchasing department, while on the second floor is the directorate and the test kitchen. There are also extensive control laboratories which are equipped with the latest scientific apparatus. The tower contains the service departments.

The building was designed by T. P. Bennett and Sons, and the construction carried out by Sir Robert McAlpine and Sons. Building commenced in 1957 and the main structure was completed last November.

Baker Perkins' apprentice school

The Right Hon., the Earl of Halsbury, president of the Institution of Production Engineers, opened Baker Perkins' new apprentice school at Bedewell Works recently. Also present for the opening were Mr. A. I. Baker and Mr. H. Crowther (chairman and vice-chairman respectively of Baker Perkins board of management).

The new apprentice school is the third to be opened by the Baker Perkins group of companies. The first, at Peterborough, was opened in 1954 by Mr. Harold Watkinson, then Parliamentary Secretary of the Ministry of Labour and National Service. The second was opened last year at Leeds at one of the Forgrove Machinery Co., Ltd.'s, works by Mr. Robert Carr, then Parliamentary Secretary of the Ministry of Labour and National Service and chairman of the committee which produced the report "Training for skill."

All the Baker Perkins' apprentice-schools have been equipped with the most up-to-date machine tools and equipment.

A new all-steel forward control cab designed for driving comfort combined with forward visibility has been fitted to the Karrier Bantam *2-3 ton chassis. A new bucket type, fully adjustable driving seat with a two-seater bench unit alongside is fitted together with a one-piece panoramic vision windscreen. In addition, the new cab is three inches higher than the previous model, allowing the deeper windscreen to be fitted. The seats are upholstered in two tone leather cloth.*

R.S.H. examinations

Dates and centres for Royal Society of Health examinations are as follows:

Food hygiene: Newcastle-upon-Tyne, April 17-18; London, April 24-25 and December 4-5; Liverpool, May 22-23 and November 13-14; nutrition in relation to catering and cooking: Liverpool, May 22-23; Birmingham, June 19-20; London, July 17-18.

British distributors

Chas. H. Windschuegl, Ltd., have been appointed the British distributors for the anti-foaming agent, *Antispumin 7517*, made by Chemische Fabrik Stockhausen and Cie. This agent is described as suitable for use in the yeast and sugar and molasses industries. It is a combination of a fatty acid with liquid hydrocarbons and a nonionic emulsifier.

André Mayer Fellowships

The Food and Agriculture Organisation of the United Nations has announced that it will offer 10 or 12 André Mayer Fellowships in 1959.

Among the subjects for which these awards may be made are: fisheries, forestry, and forest products; nutrition (non-medical); atomic energy in food and agriculture; and agricultural economics (commodities, statistics, economic analysis).

Erections and Extensions

British Cocoa Mills (Hull), Ltd., are extending their factory at Tower Street, Hull, Yorkshire.

The Wonder Baking Co., Ltd., are having a bakery built on a site at St. James' Street, Croydon, Surrey.

Wood and Watson, Ltd., mineral water manufacturers, will shortly extend their factory at Gilesgate, Durham.

Allmay and Leyfield, Ltd., sugar millers, are having extensions built to their factory in Holden Street, Liverpool, 8.

Rea's, Ltd., ice cream manufacturers, are having a factory built on a site at Longlands Road, Middlesborough, Yorks.

British Canners, Ltd., are reconstructing and enlarging their storage building in Beawell Street, Hereford.

Rowntree and Co., Ltd., are extending their branch distribution depot at Liverpool.

Mellors, Ltd., mustard manufacturers, are planning to build extensions to their factory in Mill Royd Street, Brighouse, Yorks.

Matthew White and Co., Ltd., will shortly extend their cereal mills in Washington Street, Glasgow, C.3, Scotland.

Dicky Bird, Ltd., ice cream manufacturers, have had plans approved to extend their factory at Alfred's Way, Barking, Essex.

British Sugar Corporation, Ltd., will shortly extend their factory and sugar extraction plant at Allscott, near Wellington, Shropshire.

Hindhaughs, Ltd., corn millers, have had plans approved to extend their mill, warehouse, and loading dock in Pitt Street, Newcastle-on-Tyne, 1.

Chambers Wharf and Cold Store, Ltd., are having a cold store and distribution depot erected on a site in Higham Hill Road, Walthamstow, London, E.17.

Company Profits & Prospects

600 Group interim

A dividend of 4½%, less tax, has been recommended on the ordinary shares of the George Cohen 600 Group, Ltd. The firm were not able to make any forecast about the final ordinary dividend.

Cow and Gate as forecast

The total profits before taxation for the Cow and Gate Group, Ltd., amounted to £1,631,261 (£1,567,525). The final interim dividend for the year 2.4d. per unit of ordinary stock making a total for the year ending September 30, 1958, of 20% as forecast.

Higher Beecham interim

A second interim dividend of 7%, less tax, on the ordinary shares, has been declared by the Beecham Group, Ltd., for the year ended March 31, 1959. This compares with 6%, less tax, for the second interim the previous year.

Henry Simon distribution

Henry Simon (Holdings), Ltd., have declared a special distribution of 4½d. per ordinary share, to be paid out of the realised capital profits of the company. It has no relevance to the final dividend.

Export trading lower

Trading in export markets has decreased less than might have been expected, given the low return for many primary goods produced abroad, and the consequent decrease in buying power, according to the chairman of Brand and Co., Ltd., Lt.-Col. J. E. Ridley. At home, he reported, the sales of invalid foods had been satisfactory, but the sales of spreads had increased at the expense of pastes.

A final dividend of 11¼%, making a dividend of 16¼% for the year, was approved.

Cuba and sugar prices

Speaking at the a.g.m. of Tate and Lyle, Ltd., Mr. Ian D. Lyle, the chairman, stated that it was surprising how little effect the revolt in Cuba had on sugar prices. Affairs had seemed to quieten down, and he had no doubt that the new regime will wish to continue supplying raw sugar, most of which the firm used for their re-export trade. He went on to say that if, however, the unforeseen happens and any reluctance is shown to trading with Great Britain, there are plenty of alternative sources from which supplies can be drawn.

The trading profit for the year ended September 27, 1958, amounted to £4,587,103, and the net profit was £1,859,477. The ordinary dividend for the year was 16½%.

Forthcoming Events

Society of Chemical Industry

Food Group

April 1. Nutrition Panel annual general meeting. Facts about food supplies. Prof. H. Nichol. 14, Belgrave Square, London, S.W.1, 6.15 p.m.

May 1. Joint meeting with the Royal Society of Health, Section B (Food and Nutrition). Consumer protection in foodstuffs. Presidential address by Dr. J. R. Nicholls. Papers by Miss Eirlys Roberts, Colin Dence and H. E. Monks. R.H.A. Annual Health Congress, Harrogate.

Institute of Production Engineers

April 29. 1959 George Bray Memorial Lecture. The Search for Productivity in a Food Industry. Mark Bogard. Assembly Hall, Royal Commonwealth Society, Northumberland Avenue, London, W.C.2.

Amalgamation

Powell Lane Manufacturing Co., Ltd., Gloucester, which came into the Reed Paper Group in 1944, has become part of Reed Corrugated Cases, Ltd., and will be known as the Powell Lane Branch. Mr. J. G. Holmes has been appointed branch general manager.

Vegetable product

Campbell's Soups, Ltd., have introduced a product called *V-8 Vegetable Juices*. It is a blend of the juices of eight fresh vegetables—carrots, celery, tomatoes, watercress, beetroot, parsley, spinach, and lettuce.

The product is said to be enormously popular in the U.S.A. and Canada.

Campbell's Soups, Ltd., plan to introduce a number of their products to this country on a large scale. In order to do this they are constructing a plant at King's Lynn, in Norfolk. *V-8* will continue to be produced at a plant in Milan.

"Yorkshire Parkins" for the Fiji Islands

A consignment of 30 cases of biscuits left the Team Valley recently on the first stage of a journey to the Fiji Islands, in the Pacific. This is the third order Shaws Biscuits, Ltd., have exported to the Fiji Islands in the past year. The first was for 10 cases in January last year, then in April came a request for 20 cases, and now this latest order which is being sent to Suva, the capital of the Fijis.

The order is made up of 10 cases of *Yorkshire Parkins* and 20 cases of *Honey Crunch Cookies*—two specialities of the firm.

Technical Press Review
April

World Crops.—Pastures: Profitable Use of Fertilisers; Basic Factors in Herbage Production—Winter Meeting of the British Grassland Society; Potassium for Pastures; Importance of Silage; Fighting the Cocoa Capsid in Ghana—2.

Manufacturing Chemist.—Corrosion Exhibition Preview; How Biochemical Engineering can cut Costs in Antibiotic Manufacture; Pharmaceutical Dispersions of Solids in Liquids; 2-Vinylpyridine—A Versatile Intermediate; Interferon and Other Anti-Viral Substances.

Dairy Engineering.—Floors and Walls: How to Choose a Floor; Cleaning and Maintenance of Floors and Walls in the Dairy; Review of Wall and Flooring Materials; Bulk Handling Progress in Scotland; The Factory Exhibition; Selling Milk to Two Nations.

Atomic World.—Uranium Dioxide as a Reactor Fuel; Metallic Uranium—Today's Reactor Fuel; Nuclear Fuel Cycling; Preview of Engineering, Marine, Welding, and Nuclear Energy Exhibition.

Petroleum.—Previews: Corrosion Exhibition, Engineering, Marine, Welding, and Nuclear Energy Exhibition; Utilisation of Residual Fuel Oil—1; Well Acidising and Development; Corrosion Problems with Pressure Vessels; China's Growing Oil Industry; Aspects of Refinery Corrosion due to Crude.

Automation Progress.—Cost Accounting in Conditions of Automation; Technological Progress in the Glass Industry; Scope and Advantages in Electronic Process Control; Transient Response in Electromagnetic Clutches; Can We Build a Self-Optimising Plant, The Present State of Digital Technique.

Paint Manufacture.—Preview of the Corrosion Exhibition; How Paints Stand up to Tropical Climates—2; Lead in Corrosion Resistant Paints; Hazards in Paint Factories.

Chemical and Process Engineering. — New Applications of Plastics in Chemical Plant; Graphite as a Material of Construction for Heat Exchangers; Meehanite as a Material of Construction for Chemical Plant; Chart of Materials of Construction for Chemical Plant; Pumping Developments; Preview of Engineering, Marine, Welding, and Nuclear Energy Exhibition.

For specimen copies write to Leonard Hill House, Eden Street, London, N.W.1.

Food News Overseas

U.S. meat prospects

The outlook for the American meat industry for this year is the brightest in years, George Stark, of Indianapolis, chairman of the board of directors of the American Meat Institute, said recently.

Mr. Stark said that the American housewife not only can expect to have more meat on the family table during 1959 than was available in 1958, but that more of it will be of better quality. He forecast that *per capita* consumption will rise to approximately 156 lb. of meat during the year, an increase of 4 lb. over the 1958 level.

Total U.S. supplies for 1959 are estimated at more than 27,000 million lb. meat, about 1,500 million more than was available in 1958. Most of the increase will be in pork, with beef, veal, and lamb supplies remaining at about 1958 levels.

Australian canned fruits

The Australian Canned Fruits Board's researches show that the British have the sweetest teeth in the world. Mr. Robert Heanley, the Board's United Kingdom representative, says that, accordingly, all Australian canned fruits are being made sweeter to suit the British palate. Syrup strengths of both standard and choice grades of all deciduous packs are to be increased by 5%.

The wording on labels is being revised. For standard grade fruit the words "In heavy syrup" are to be printed on labels, and for choice grade the words "In extra heavy syrup" will now appear.

Australian meat venture

A start is being made by a private meat company to open up the oversea meat trade of Australia's Northern Territory to the United Kingdom and the United States of America. In May work will start on the construction of a modern abattoir and treatment plant at Katherine, 200 miles south of Darwin.

Mr. William Bishop, chairman of William Bishop Ausbeef, Ltd., the firm sponsoring this development, says he plans to export boneless beef to America and the islands north of Australia, and he hopes to export high-grade beef to the United Kingdom to compete with Argentine beef.

About 10,000 head of cattle will be slaughtered and processed in the first year of operations. This figure will be increased substantially later.

Mexican meat packing plant

A new meat packing plant was opened in Mexico City recently claiming to be the biggest and best equipped in Latin America.

Sea food factory

The Mexican firms of Empacadora Escuinapa S.A. and Hielo y Congelacion S.A., associated companies, have opened a large plant for packing, tinning, and freezing sea food in Escuinapa, Sinaloa, Mexico. The plant is designed to produce about 300 tons of sea food, mostly canned and frozen shrimps, a week. The companies are planning to build another similar plant at Rosario, Sinaloa.

Brazilian food firm expands

The Companhia de Leite e Cafe Soluvel at Braganca Paulista has raised its capital from CR$100 million to CR$150 million in order to increase its equipment. The new equipment is being supplied largely by A.P.V. do Brasil, and will enable the company to increase production sixfold. The company manufactures powdered milk and a soluble coffee called *Lei-Caf*.

Australian winery plans

Loxton Co-operative Winery and Distillery, Ltd., of South Australia, has increased its wine storage tanks to 80.

A recent addition to the winery is the 80 ft. sq. brandy bond store, which is built on two levels. Cement chairs have been laid for the support of 58 vats ranging from 1,000 to 6,000 liquid gal. capacity. The top floor will contain hogsheads of spirit distilled in a separate building and transferred by pipeline to the store. The brandy bond will be brought into operation for this year's harvest.

The winery has also just completed a new crusher pit built to handle the 10,000 tons of grapes which have been anticipated for the coming season.

Norwegian food subsidies

The Norwegian Government has announced that it will take certain steps to keep the price index down. The most important is that it will invite the Storting (Parliament) to spend 100 million kroner (£5 million) to subsidise certain staple commodities such as milk and cheese. The amount is to be used during the months March-July.

Europak, 1959

The packaging exhibition, Europack, will be held in Amsterdam, Holland, from April 21-28.

Food exposition

The international food exposition, AIDA 59, will be held at the Palais de Beaulieu, Lausanne, Switzerland, commencing on June 13, 1959.

Joint tuna industry

Details have been agreed for a joint Japanese and Singapore venture to establish a tuna fishing and canning industry in Singapore. It is understood that about $2 million will be required to start the industry, which it is hoped will provide employment for about 250 people to begin with. A four man team of fishery experts from Japan visited Singapore last December to make a survey and take part in discussions.

Ceylonese flour purchases

A Ceylonese Government official, Mr. Alvapillai, stated in Sydney recently that Ceylon would purchase at least 100,000 tons of Australian flour this season, *i.e.* over three times the amount Ceylon bought last year. Mr. Alvapillai is Permanent Secretary to the Ceylon Ministry of Agriculture, and was in Australia to discuss flour purchases.

He said that people in Ceylon preferred Australian to European flour, which had been heavily supplied during the last few years.

Cocoa statistics

The Statistical Committee of the FAO Cocoa Study Group estimates world production of cocoa beans in 1958/59 at 850,000 metric tons, 75,000 tons more than the revised estimate of 775,000 tons of the 1957/58 crop.

The 1958/59 figure for Brazil contains an estimate of the winter crop, the harvesting of which begins in May. The October-April Brazil crop this year is higher than last year, and the forecast for the May-September crop is almost equal to the production for the same season a year ago. In some cases estimates for the smaller producing countries are based on exports plus domestic usage.

In Ghana, Nigeria, and French Africa the crop is estimated at 470,000 tons, which is 52,000 tons larger than in 1957/58, marking a recovery from the poor crops harvested last year in Ghana and Nigeria.

Trade Marks

MELAFAT.—780,081. Feedingstuffs for animals and for poultry, all containing fats. **Kassero, Ltd.,** Albert Road, St. Phillips, Bristol, 2.

MILLAC.—780,711. Milk powder. **L. E. Pritchitt and Co., Ltd.,** Uxbridge Road, Hatch End, Middlesex.

FULCRUM.—780,750. Emulsified edible fats containing mineral salts for use in the food industry. **The Southern Oil Co., Ltd.,** Westinghouse Road, Trafford Park, Manchester.

CASTANET.—780,950. All goods included in Class 29. **Isaac Modiano, Brother and Sons, Ltd.,** 5, Lloyds Avenue, London, E.C.3.

CHEESE KIST.—781,176. Cheese-flavoured potato crisps. **Kenneth Partington Bromilow,** trading as **B. and B. Products,** Manchester Road, Wingates, Westhoughton, Lancs.

FLOPSY.—777,469. Bread, biscuits (other than biscuits for animals), pastry, non-medicated confectionery, ices, honey treacle and preparations made from cereals for food for human consumption. **Roberta Lewin,** Pelham House, Bracknell Gardens, London, N.W.3.

FOUR SEASONS.—779,862. Soups; and preparations included in Class 29 for making soups. **Fussell and Co., Ltd.,** Hayes, Middlesex.

PYRUP.—780,141. Preparations included in Class 29 for use in spreading on foodstuffs. **Flak Lighter Fuel Co., Ltd.,** 19, Fenchurch Street, London, E.C.3.

KUBITS.—B780,364, and **CUBITS.**—B780,365. Fruits and vegetables, all being preserved. **Langeberg Ko-operasie Beperk,** Ashton, Cape Province, Union of South Africa

BLUE ROOM.—781,159. All goods included in Class 29. **Nicholls and Co. (Sheffield), Ltd.,** Shalesmoor, Sheffield, 3, Yorks.

SUN ROSE.—777,227. All goods included in Class 29, but not including margarine, potted meat or fish paste, or any goods of the same descriptions as any of these excluded goods. **Culrose Foods, Ltd.,** Culrose House, 100, Tooley Street, London, S.E.1.

MELBRAY GREEN RIBAND.—772,743. Ice cream confectionery. **Melbray, Ltd.,** 158-162, Hurlingham Road, London, S.W.6.

READY BREK.—B782,420. Cereal preparations prepared for food for human consumption. **J. Lyons and Co., Ltd.,** Cadby Hall, London, S.W.14.

GOLDEN HEAD.—780,409. All goods included in Class 29, but not including condensed milk or any goods of the same description as condensed milk. **William C. Watkins, Ltd.,** Commercial Sale Room, Winchester Square, London, S.E.1.

SILVER DIAMOND.—781,301. Edible fats. **J. Bibby and Sons, Ltd.,** 21, King Edward Street, Liverpool.

ELBON.—782,046. Glacé cherries, cut mixed peel, ground almonds, currants and sultanas. **Henry Noble and Son, Ltd.,** 10, Stoney Brae, Paisley, Renfrewshire.

EPICTONGUE.—782,638. Tongues (for food). **The Epicure Ham Co., Ltd.,** 2 Church Row, Pershore, Worcestershire.

EPICHAP.—782,639. Bath chaps. **The Epicure Ham Co., Ltd.,** 2, Church Row, Pershore, Worcestershire.

SUN ROSE.—777,228. All goods included in Class 30, but not including cakes, biscuits, bread, pastry, flour confectionery or any goods of the same description as any of these excluded goods. **Culrose Foods, Ltd.,** Culrose House, 100, Tooley Street, London, S.E.1.

NOCAB.—782,691. Meat; fish, poultry and game, none of them being live; meat extracts; dried and cooked fruits; eggs, milk and dairy products (for food); and edible oils and fats. **Jessett and Henry, Ltd.,** 1-9, Park Mews, Park Road, Hampton Hill, Middlesex.

PRAIRYCRACKER.—782,255. All goods included in Class 29. **Oxo, Ltd.,** Thames House, Queen Street Place, London, E.C.4.

LIBERTY GOLD.—781,872. Dried and canned fruits. **Liberty Gold Fruit Co., Inc.,** 64, Pine Street, San Francisco, California, U.S.A.

GOLDEN HEAD.—780,410. All goods included in Class 30. **William C. Watkins, Ltd.,** Commercial Sale Room, Winchester Square, London, S.E.1.

LOUISIANA MAMMY.—780,544. Rice, tapioca, sago, flour and preparations made from cereals for food for human consumption. **Louisiana State Rice Milling Co., Inc.,** Abbeville, Vermilion, Louisiana, U.S.A.

CONSUL.—781,260. Non-medicated boiled sugar confectionery and toffee. **Confectionery Sales, Ltd.,** 24, Coleman Street, London, E.C.1.

CARA-CUBES.—782,603. Wafer biscuits. **Askey's Premier Biscuit Co., Ltd.,** 290, Kensal Road, London, W.10.

LENO.—777,530. All goods included in Class 30. **Vsesojuznoje Objedinenije Prodintorg,** Smolenskaja-Sennaja, 32-34, Prodintorg, Moscow, Russia.

GATEWAY.—782,892. Fruits and vegetables, all being cooked, preserved or dried. **Burgess, Webb and Squire, Ltd.,** Threefield Road, Southampton.

LEARIG.—783,327. Butter, cheese, milk powder and milk products for food. **Kilmaurs Dairy Farmers, Ltd.,** Tourhill Creamery, Kilmaurs, Ayrshire.

BISKAVITE.—775,352. Biscuits (other than biscuits for animals). **Andomia Products, Ltd.,** 10, Grant Street, Bradford, Yorks.

AMAMA.—777,124. All goods included in Class 30. **Glaxo Laboratories, Ltd.,** 891-995, Greenford Road, Middlesex.

AMOMA.—777,126. All goods included in Class 30, but not including biscuits or confectionery or any goods of the same description as biscuits or confectionery. **Glaxo Laboratories, Ltd.,** 891-995, Greenford Road, Middlesex.

POLLIES.—B779,583. Tea. **J. Lyons and Co., Ltd.,** Cadby Hall, London, W.14.

HALL'S MAJESTIC SOUR LEMONS.—781,796. Non-medicated sugar confectionery flavoured with lemon. **Hall Bros. (Whitefield), Ltd.,** The "State" Confectionery Works, Stanley Street, Whitefield, nr. Manchester.

All books reviewed in FOOD MANUFACTURE as well as any other scientific or technical book may be obtained from:

Technical Books
308, Euston Road
London, N.W.1.
Tel: Euston 5911.

Prompt attention is given to all orders.

New Companies

E. Brown and Son (Southampton), Ltd. (618503.) Queens Way, Southampton. To take over the bus. of sausage mnfrs. carried on at Brunswick Square, Southampton, known as "E. Brown and Son," etc. Dirs.: R. C. A. Owton and A. H Bower.

Cathley, Ltd. (618626.) Mnfrs. of and dlrs. in foodstuffs, alcoholic and soft drinks, chemicals and generally in all materials, provisions and produce, etc. £100. Dir.: Cecil Best, 137, Welbeck Road, West Harrow, Middlesex.

P. G. Constable, Ltd. (620376.) 11, High Street, Uxbridge, Middlesex. Bakers, etc. £1,500. Dirs.: P. G. Constable, E. J. Beasley and Margaret H. Poppitt.

Cremsa Quality Egg Processing Co., Ltd. (620598.) Westinghouse Road, Trafford Park, Manchester, 17. £5,000. Dirs.: Ricardt R. and Margaret M. Sorensen.

Enjoy Products, Ltd. (618416.) All Saints Chambers, Eign Street, Hereford. Mnfrs. of and dlrs. in foodstuffs, etc. £2,000. Dirs.: Sydney A. and Phyllis M. Mailes.

Glutogen, Ltd. (616865.) Old Bank House, Irongate, Derby. Wholesale dlrs. in gluten and similar products and ingredients used in the manufacture of foodstuffs. £5,000. Dirs.: Eric G. Robinson and J. J. Nicholson.

Fishers Feeds, Ltd. (616573.) To carry on the bus. of mnfrs. of and dlrs. in cattle and poultry foods, etc £5,000. Subs.: J. R. Fisher, Ltd., Great Union Street, Hull, and C. W. Patchett.

James Harries and Sons (Tovali), Ltd. (617416.) Tovali Mineral Water Works, Carmarthen. Mnfrs. and bottlers of and dlrs. in mineral and aerated waters, etc. £5,000. Dirs.: David D. and Mrs. L. A. Harries.

Richard F. Hicks, Ltd. (616610.) 117, Queens Way, Petts Wood, Kent. To carry on the bus. of biscuit mnfrs., etc. £100. Dirs.: Richard F. and Mavis V. Hicks and Frank Barnes.

Kol-Tov, Ltd. (617249.) 120-121, Newgate Street, London, E.C.1. Mnfrs. of and dlrs. in meat and allied food products, cooked meats, etc. £100. Dirs.: David Rose and A. I. Feldman.

Leafless Tea Co., Ltd. (617250.) 41, St. Mary Axe, London, E.C.3. £100. Dirs.: J. E. Fishburn and Brian Figgis.

Thomsons Bakeries (Brighton), Ltd. (616648.) 4 Sydney Street, Brighton. Bakers, confectioners, etc. £1,000. Dirs.: Skene, Mrs. Gladys D., and Florence Thomson.

Vale of Lune Creamery, Ltd. (616791.) The Creamery, Barbon, Westmorland. To take over the bus. of wholesale dairy and creamery carried on at Barbon, Westmorland, by Lunesdale Farmers, Ltd. £10,000. Dirs.: Mrs. Mary M. Scott and C. J. H. Nelson.

S. A. Williams (Bakers), Ltd. (616876.) 102, West Derby Road, Liverpool. To take over bus. of bakers, confectioners, and grocers at West Derby Road, and bus. of bakers and confectioners, C. F. Law, Ltd., Wilburn Street, Scotland Road, and Stanley Road. £500. Dirs.: Stanley A. and Maria C. Williams.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

Packaging

Pepper container

Haven Foods, Ltd., have brought out a new type of 2 oz. pepper tin which is suitable not only for dispensing pepper direct into a caster but also as a sprinkler for kitchen use. The plastic seal at the top is removed and reversed. It will then slide either way for easy sprinkling or pouring.

A fine grade of pepper is packed in the tin, and it is said that it will keep in perfect condition for an almost indefinite period.

The container was designed by Richard Lonsdale-Hands Associates, Ltd., and produced by the Metal Box Co., Ltd.

Packing Danish bacon

The Danish Bacon Co., Ltd., are now using *Metathene*, a *Diothene*-coated cellulose film made by the Plastics Group of the Metal Box Co., Ltd. Metal Box say that they are using it for their packs of Danish smoked streaky and smoked back rashers of bacon because it is excellent for vacuum packing, and because it is exceptionally strong.

The pack is boldly and effectively reverse printed in red, white, and black on the underside of the cellulose, the print being locked in between the two films.

The packs are automatically vacuum-sealed on the *MB No. 24* vacuum drawing and pocket sealing machine.

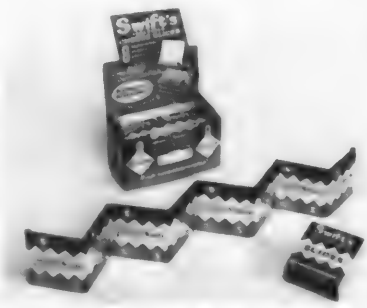
Processed cheese pack

Swift and Co., Ltd., are now producing a new pack for their sliced processed cheese which comprises a strip of 8 separate pouches sealing each slice individually. The pack, known as the *Concertina*, is produced from aluminium foil supplied by Venesta, Ltd.

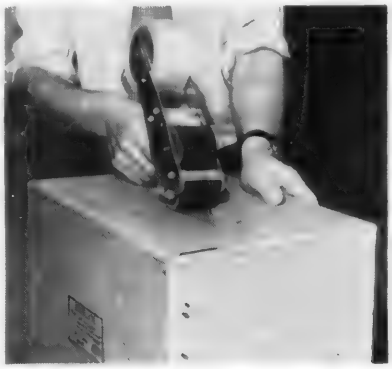
Each pouch contains $\frac{7}{8}$ oz. of cheese, the slice measuring 3 × 3$\frac{1}{4}$ × just under $\frac{1}{8}$ in. The foil used to wrap the cheese is of .012 mm. gauge and it is aniline printed, featuring Swift's name design in blue and red on silver.

In production, the cheese is transferred to what is virtually a flat tube of aluminium foil, heat-sealed to provide a tear-off strip on the finished article. During pressing and moulding of the cheese into slices perforations are incorporated between each slice. The slices are then folded automatically and packaged into units.

The present output of the machine used for producing the pack is over 1,000 per hr.



The Concertina pack for sliced processed cheese made by Swift and Co. from Venesta aluminium foil.



The portable hand operated carton sealer made by Gordon and Gotch (Sellotape), Ltd., for sealing cases.

The plastic seal on the top of this pepper tin, made by the Metal Box Co., Ltd., can be reversed; it will then slide back and forth for sprinkling or pouring.

Easter range of packs

Several new packs have been introduced by C. Kunzle, Ltd., for their Easter range of confectionery.

The first is their *Humpty Dumpty* milk-chocolate filled Easter egg which is wrapped in a nursery rhyme-printed foil, tied with a primrose ribbon. The carton is printed in four colours and packed in a corrugated container printed with the contents.

The second is an Easter basket which contains foil-covered chocolates and has a couple of chicks sitting on either end, with a bow of narrow ribbon across the centre. An acetate window in the carton gives full display to the basket.

The third item is *Chick Parade* milk-chocolate filled Easter egg wrapped in green embossed foil and tied with yellow ribbon. This is packed in a hexagonal multi-coloured carton. Fourth is the *Rossette* milk-chocolate filled Easter egg which is wrapped in green and gold foil. This is packed in an acetate carton with a green and gold base. The lid of the container is held in position by a cord thread.

Hand carton sealer

A new portable hand-operated carton sealer is being marketed by Gordon and Gotch (Sellotape), Ltd. Developed by Adhesive Tapes, Ltd., the *hand carton sealer* has been designed to seal fibreboard or corrugated cases in the form of "U" seals. The "cut-off" is controlled. The protected cutting blade is automatically operated after completing the seal, thus preventing unnecessary waste of tape.

This portable dispenser measures 10 in. × 2$\frac{1}{2}$ in. × 6$\frac{1}{2}$ in. Built in aluminium alloy, it weighs 2 lb. 6 oz. (including *Sellotape* roll).

The sealer takes tapes up to 2 in. wide and holds a tape length of 72 yd. with a roll core of 3 in. Knurled rollers and non-return rollers hold the tape centrally in the sealer.

The smaller of the two rubber application rollers, which presses the tape firmly on to the surface, is applied 1$\frac{1}{2}$ in. to 2 in. below the top of the carton. The roller is run forward slightly to stick the leading end of the tape before it travels over the carton edge. The large rubber roller functions when the second leg of the "U" is being made down the face of the carton.

By changing the angle of the pistol grip to a vertical position at the end of its journey, the automatic cutting device is brought into action.

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

808,720. E. T. OAKES CORPORATION: Biscuit and like sandwich making machines.
809,216. MIAG MUEHLENBAU UND INDUSTRIE, G.M.B.H.: Method for the manufacture of cocoa powder.
809,532. T. WALL AND SONS, LTD.: Manufacture of sausages.
809,598. K. MISHIMA: Fermented milk products.
810,006. UNILEVER, LTD.: Fatty materials.
810,229. T. M. NUTBROWN, LTD.: Device for peeling vegetables or fruit.
810,248. KONINKLIJKE VERKADE FABRIEKEN N.V.: Bakers' ovens.
810,277. T. HEDLEY AND CO., LTD.: Liquid shortening.
810,278. T. HEDLEY AND CO., LTD.: Stable pourable oleaginous suspensions.
810,275. R. KNOLLENBERG, C. G. HAHN, and K. VON HOLDT (trading as SCHROEDER AND CO.): Manufacture of margarine.
810,371. UNITED COFFEE CORPORATION: Beverage brewing and dispensing device.
810,559. ROSE BROS. (GAINSBOROUGH), LTD.: Apparatus for applying breadcrumbs and the like to foodstuffs.
810,660. UNITED COFFEE CORPORATION: Beverage brewing apparatus.
810,689. A. J. S. MARSTRAND: Method of treating protein meal of marine origin.

ABSTRACTS OF BRITISH PATENTS

Spray drying

The invention consists of a spray drier for converting liquid egg albumen, or other suitable liquid foods, into the form of powder. In conventional methods of dehydration, the liquid is atomised and projected into a stream of hot gas. This treatment is detrimental to some products, including egg white.

In the present process, of which the apparatus is fully described, and illustrated by two sheets of drawings, atomised liquid egg albumen is sprayed under pressure into a hot gaseous medium, the pressure of the atomising gas being maintained at 7-15 p.s.i., and that of the liquid egg albumen at about 7 p.s.i. Particles of egg albumen of uniform size are stated to be obtained.—805,379. *Henningsen, Inc.* (*U.S.A.*).

Maturing agents for flour

A new class of maturing agents for flour consists of the esters, amides, amidines, and mixed esters and amides of azodicarbonic acid, sometimes called azodiformic acid. The amides, of which azodicarbonamide appears to be the most active, have no maturing action until the flour is mixed with water, when the action is extremely rapid. The amidines, which, like the amides, are solids, behave similarly. The esters, which are generally liquids, react in the absence of water, but are less active than the amides and amidines. The mixed esters and amides are mostly solids and need the presence of water to exert the maturing action.

Those compounds which are solids can be mixed directly with flour. The liquid esters may also be so incorporated or may be dispersed on a dry carrier, such as an alkali metal chloride, ammonium chloride, an alkaline earth metal chloride, or the sulphates and phosphates of alkali or alkaline earth metals. Also suitable are maize, starch, and the like.

The concentration of the additive is from 20 parts to 300 parts per 1,000,000 parts of flour, according to the compound selected. The concentrations and the results of baking tests are tabulated.—804,617. *Wallace and Tiernan, Inc.* (*U.S.A.*).

Harvesting peanuts

An apparatus, illustrated by a sheet of drawings, has been devised for separating peanuts from the parent plants, in which the plants are gripped and conveyed by their foliage by two travelling belts while the gynophors are passed through the stripping apparatus. The latter consists of two rotary beaters, each of which has at least one bar displaced from the axis of rotation of the beater. The surfaces of revolution are swept out by the bars which produce a passage along which the gynophors pass, until they reach a point of intersection of the surfaces of revolution. The blows received by the gynophors from the beaters thus increase in strength as the former pass through the apparatus. Preferably the bars are at an acute angle to the axis of rotation of its beater, and each beater has two bars symmetrically placed. Also, preferably, the gynophors and nuts are struck alternately from opposite sides.—805,224. *National Research Development Corporation.*

Stabilised vitamin A compositions

Vitamin A materials, such as the alcohol, aldehyde, acetate, palmitate, etc., whether natural or synthetic, are very labile and liable to lose activity. To prolong the period of activity, stabilising agents are proposed. These are 2.6.di-tertiary butyl-4-methyl phenol, commonly known as "butylated hydroxy-toluene" or BHT, and butylated hydroxy-anisole or BHA, usually used together, although the former may be used alone. BHA exists in two isomeric forms, 2-BHA and 3-BHA, which may be used mixed or separately, 3-BHA being the more effective. The preferred quantity of BHT alone or of BHT mixed with BHA, usually in about equal proportions, used for obtaining the required stabilising effect, is preferably from 2·0 to 30 mg. per 1,000,000 U.S.P. units of vitamin A.

In a second patent, tocopherol is used in conjunction with BHT. Tocopherol has three isomers—alpha, beta, and gamma. Any of these may be used alone or in mixtures. The tocopherol may be synthetic or obtained from soyabean oil. The preferred quantities of BHT and tocopherol, usually in the proportion of 1:5, are from 2·0 to 30 mg. of BHT per 1,000,000 U.S.P. units of vitamin A, and from 10 to 50 mg. of tocopherol per 1,000,000 U.S.P. units of vitamin A.—804,984 and 804,985. *Eastman Kodak Company* (U.S.A.).

Baking ovens

This patent is concerned with ovens for baking, or drying, of the type known as "draw-plate ovens" or "peel ovens," which comprise a baking apparatus situated within a chamber, and which may include a conveyor.

In the present invention, illustrated by a sheet of drawings, the baking chamber is located between upper and lower hot air chambers, which are rectangular and parallel. The chambers have slot-shaped apertures in their bases and tops, a hot air inlet in the back of each and through the rear wall of the oven, a door in the front wall of the oven, and a hot air outlet through the rear wall of the oven. Means are provided for supplying air to the two inlets and the outlet. Hot air is circulated into the two hot air chambers, passing into the baking ovens through the slot-like apertures and thence back into the circulating system, which is a substantially closed circuit.—805,468. *Tancred and Langley, Ltd.*

Nut flake substitutes

The subject matter of this patent is the manufacture of substitutes for edible nuts in flake form, such as flaked almonds, which are used for decorating confectionery, small cakes, and the like. The products are stated to resemble the genuine flakes in both appearance and flavour.

The starting material is of a starchy nature—for example, rice or bean flour—cooked with water or steam, with subsequent addition of milk or powdered milk with water and sugar.

In the single example of the specification, 40 kg. of a boiled starchy product, obtained from white beans or rice and water, are mixed with 6 kg. of milk solids or skimmed milk in powder form, 3·5 kg. of arachis oil, 4 kg. of a 4% solution of carboxymethyl cellulose, 36 kg. of wheat flour, and 3 kg. of finely divided sugar. The mixture is kept at 80°C. for 30 min. Optionally, there may then be added almond or hazel nut flavouring or a mixture of both. The pasty substance is rolled into sheet form and punched, cut, or otherwise shaped into the form of flakes, which are dried.—806,834. *G. A. Ruhrup and P. M. C. Geerkens* (*both of the Netherlands*).

New patents are from the Journal of Patents and new trade marks are from the Trade Marks Journal. In each case permission to publish has been given by the Controller of Her Majesty's Stationery Office. Each of the publications is obtainable from the Patents Office, 25, Southampton Buildings, London, W.C.2.

Number 8 April 1959

Expelling & Solvent Extraction (No.1)

LODERS and NUCOLINE LTD.

INFORMATION BULLETIN

Copies of this Bulletin, together with a folder, are available on request to Loders & Nucoline Ltd., Unilever House, London, E.C.4.

The main vegetable oil-seeds processed in the United Kingdom for edible purposes are Copra, Palm Kernels, Groundnuts, Cotton-seed, Soya Bean and Sunflower. The methods used for removing the oil are very simple in principle and consist of either squeezing it out of the seeds by sheer physical pressure, or it is dissolved out by a suitable solvent. These two processes are known as Expelling and Solvent Extraction respectively, and both will be described in this and the next Information Bulletin.

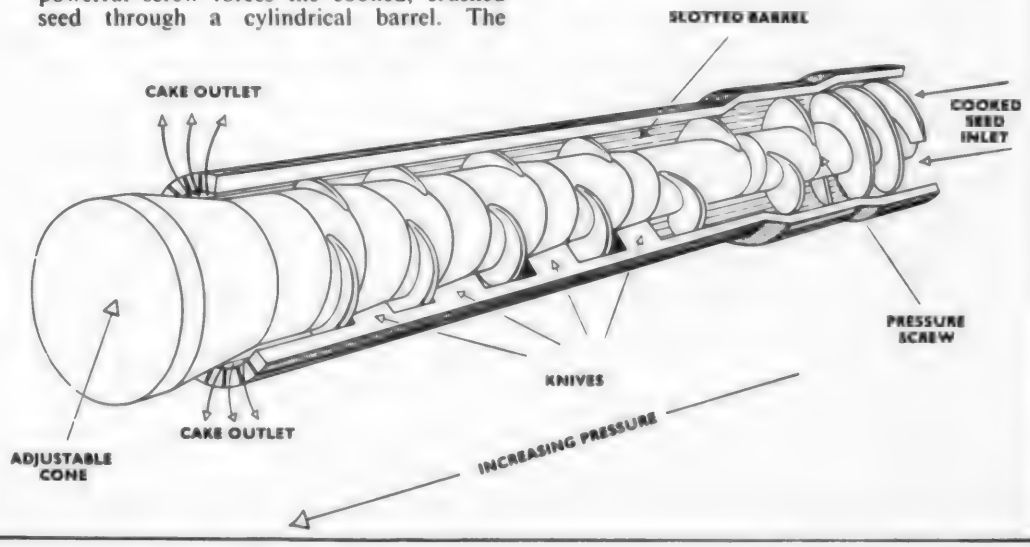
PRE-TREATMENT

The oil is contained within the seed in a number of cells or tissues, just as the juice is contained in an orange. In the case of the Coconut, for example, these cells have a minute bamboo-like structure, and it is therefore essential to soften and rupture the cells if a maximum yield of oil is to be obtained. This is done by either passing the seed through a series of heavy fluted rolls or by putting it through a hammer mill or similar disintegrator. To complete the treatment, the seed is passed to the ' kettles ', where it is ' cooked ' at a temperature of about 212°F. to reduce the viscosity of the oil and soften the cell walls.

EXPELLING

The principle of an oil expeller is very like that of a kitchen mincer. A large and powerful screw forces the cooked, crushed seed through a cylindrical barrel. The design of this screw is such that the seed is compressed by a steady reduction in the annular space, and by the choke effect of the very narrow gap at the discharge end of the barrel. A very high pressure develops and the oil ' expelled ' from the pre-treated seeds escapes through a series of small slots around the periphery of the barrel. The residue, or cake, passes through the end of the barrel and forms a useful ingredient in the manufacture of animal feeding stuffs.

There are both ' Low Pressure ' and ' High Pressure ' Expellers, and, depending upon the type of seed and the process to be used to obtain the oil, both or either may be used. The low-pressure expeller will handle 3—4 tons an hour, reducing the oil content of the seed by 50%, while the high-pressure expeller may handle as little as 10 cwt. an hour, but will remove a far greater percentage of oil. In the case of Copra and Groundnuts, for example, the expelling is done in two stages, *e.g.* with Copra the first expelling (low pressure) reduces the oil from 65/70% down to 30/40%, the second stage (high pressure) reducing the oil down to 6/6.5%. With most other seeds the expelling may be done in one stage, the final oil in cake depending on the seed processed. The solid residue from the Low Pressure Expeller receives further conditioning and passes either to the High Pressure Expeller or the Solvent Extraction Plant to remove as much as possible of the remaining oil.



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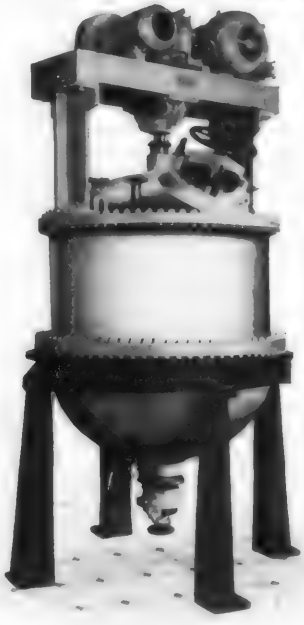

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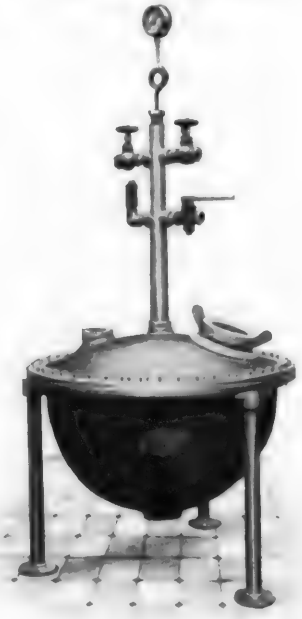

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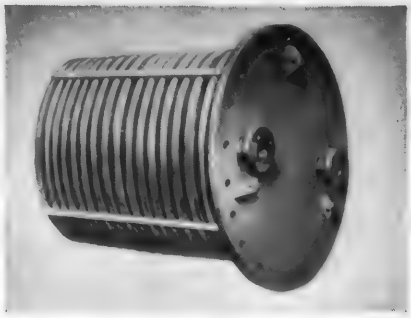

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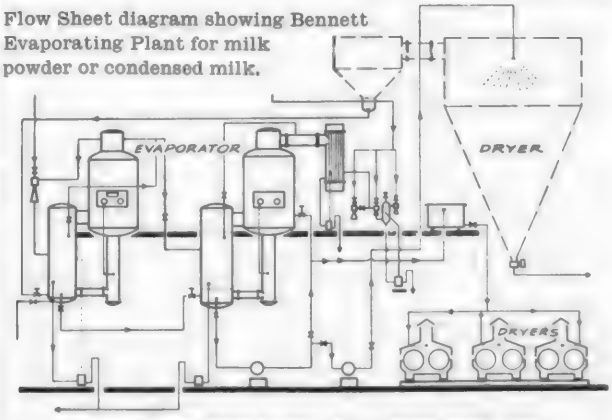

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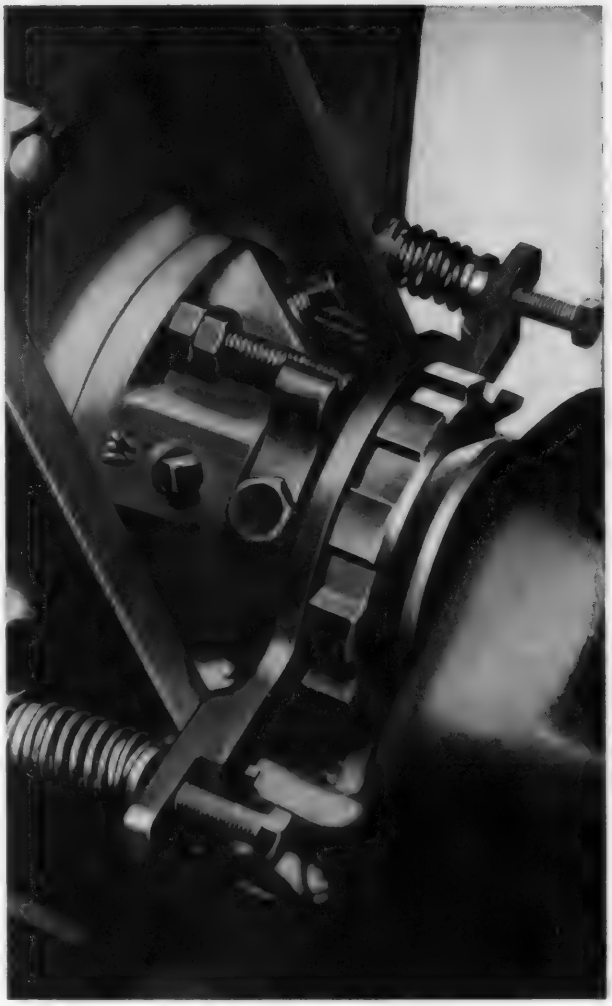

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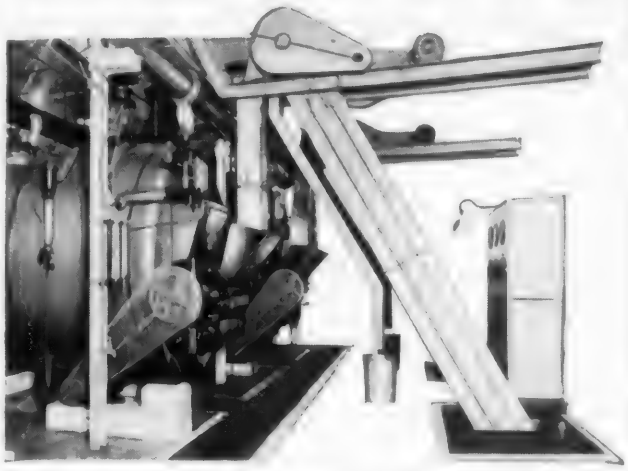

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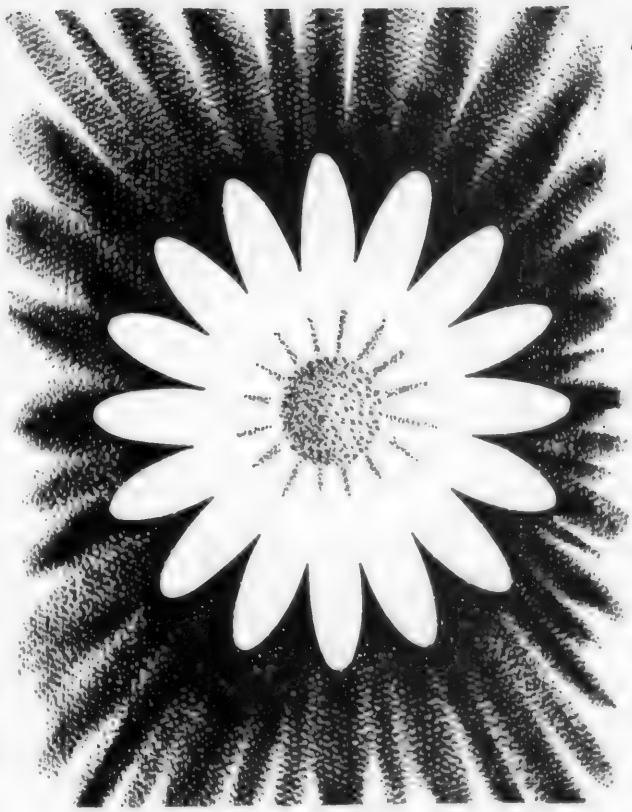

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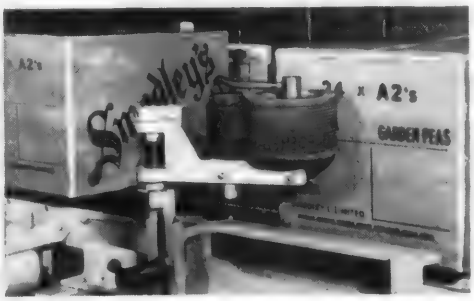

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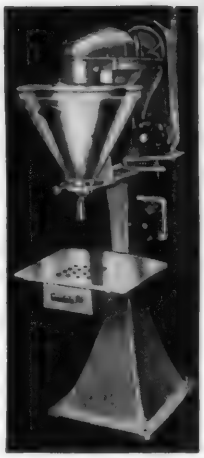

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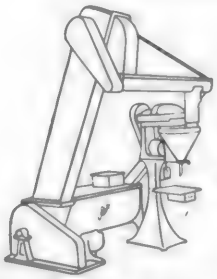

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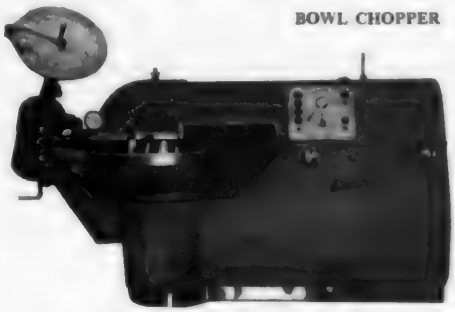

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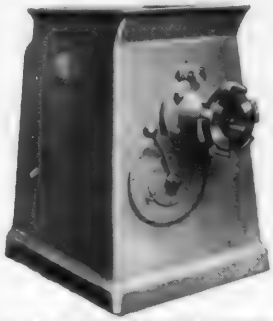

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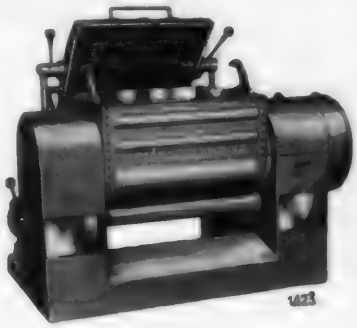

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Other carbohydrates (not starch)	13.14
Fibre	1.80
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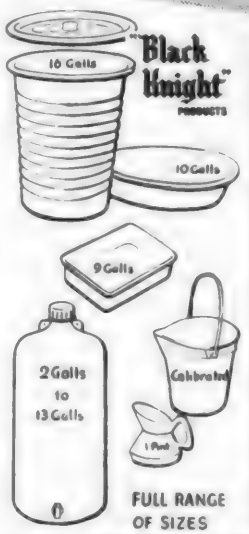

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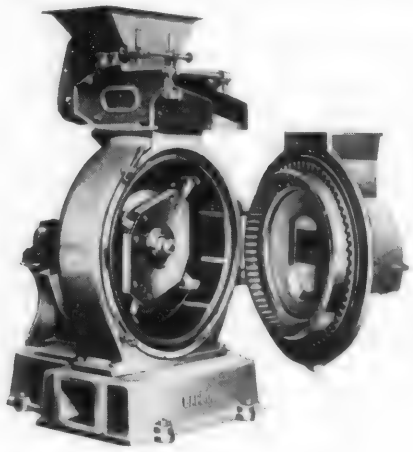

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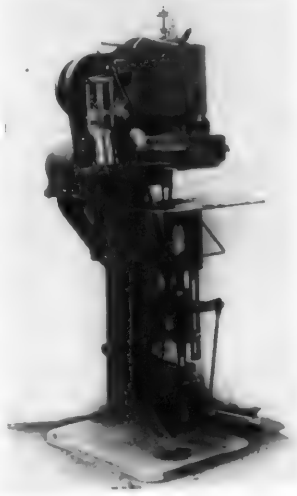

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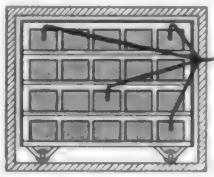

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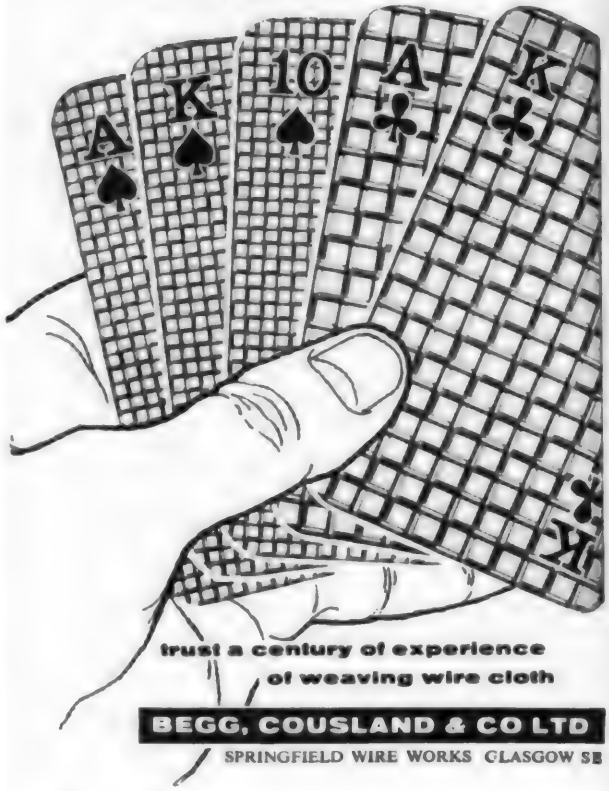

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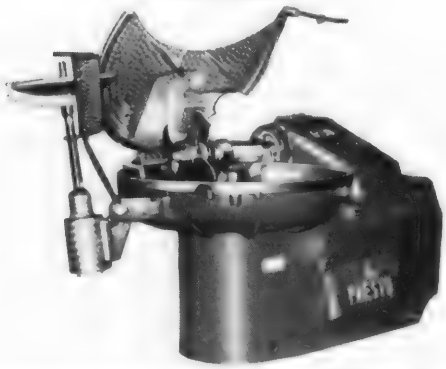

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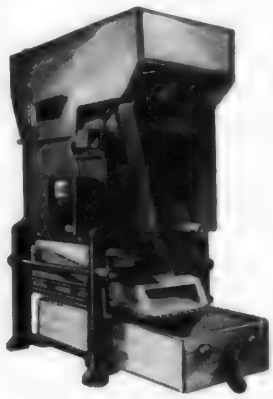

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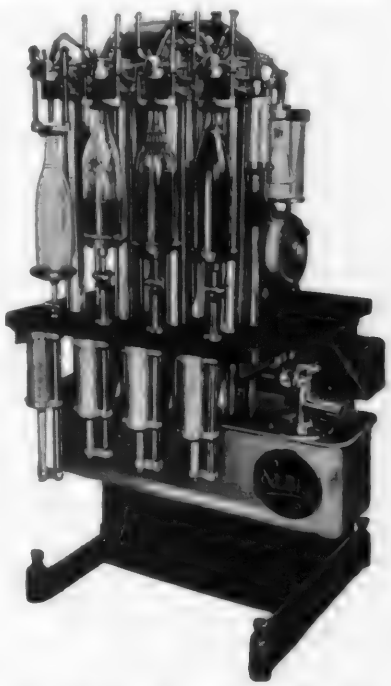

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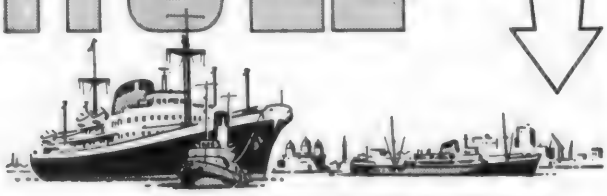

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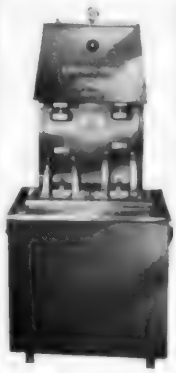

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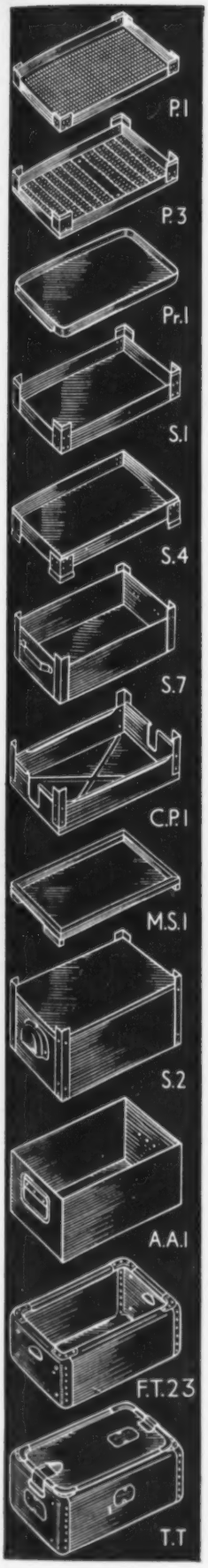

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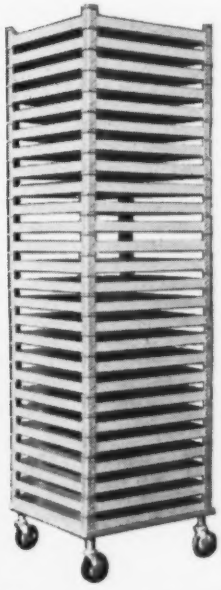

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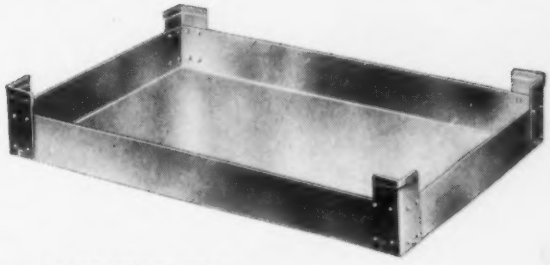

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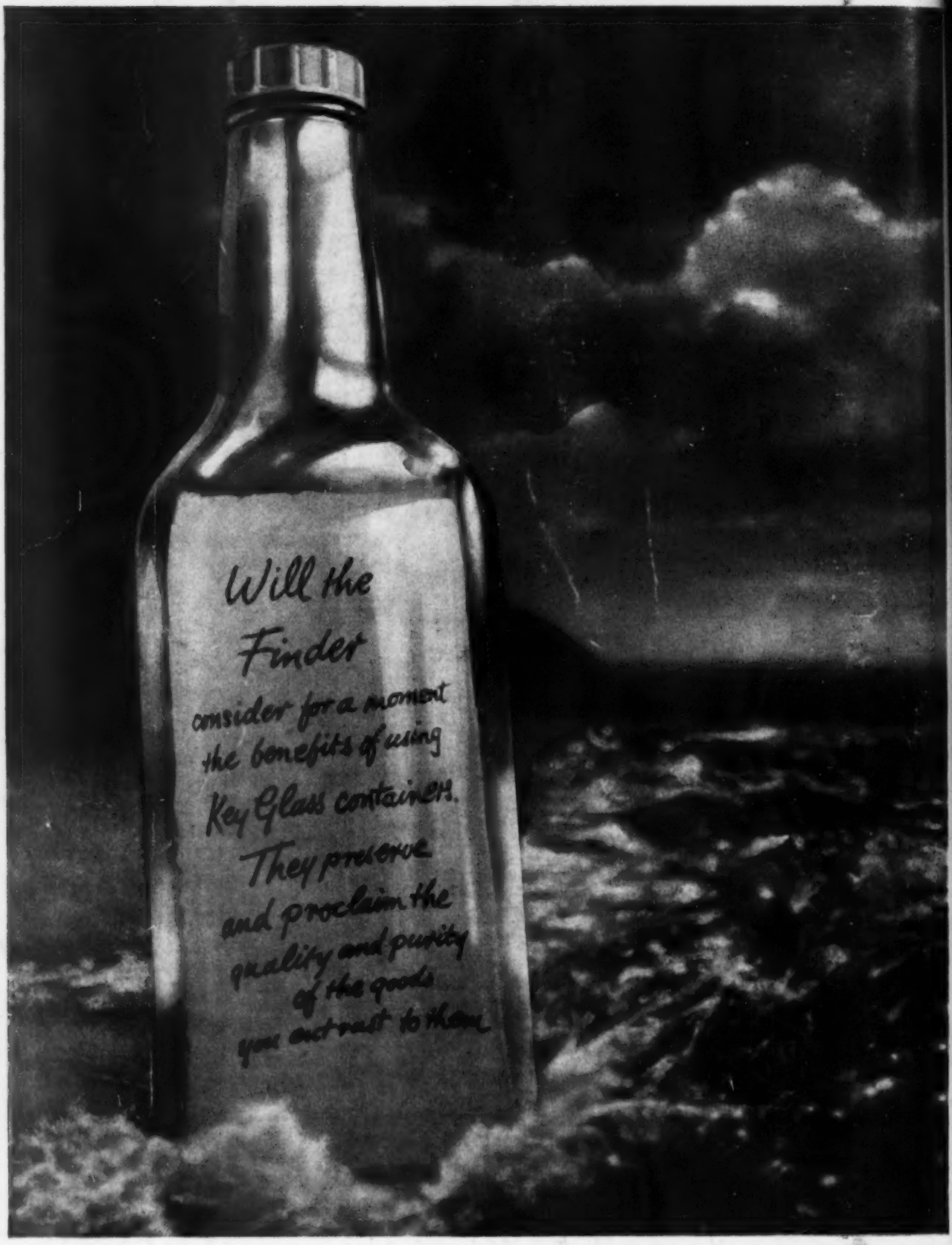

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